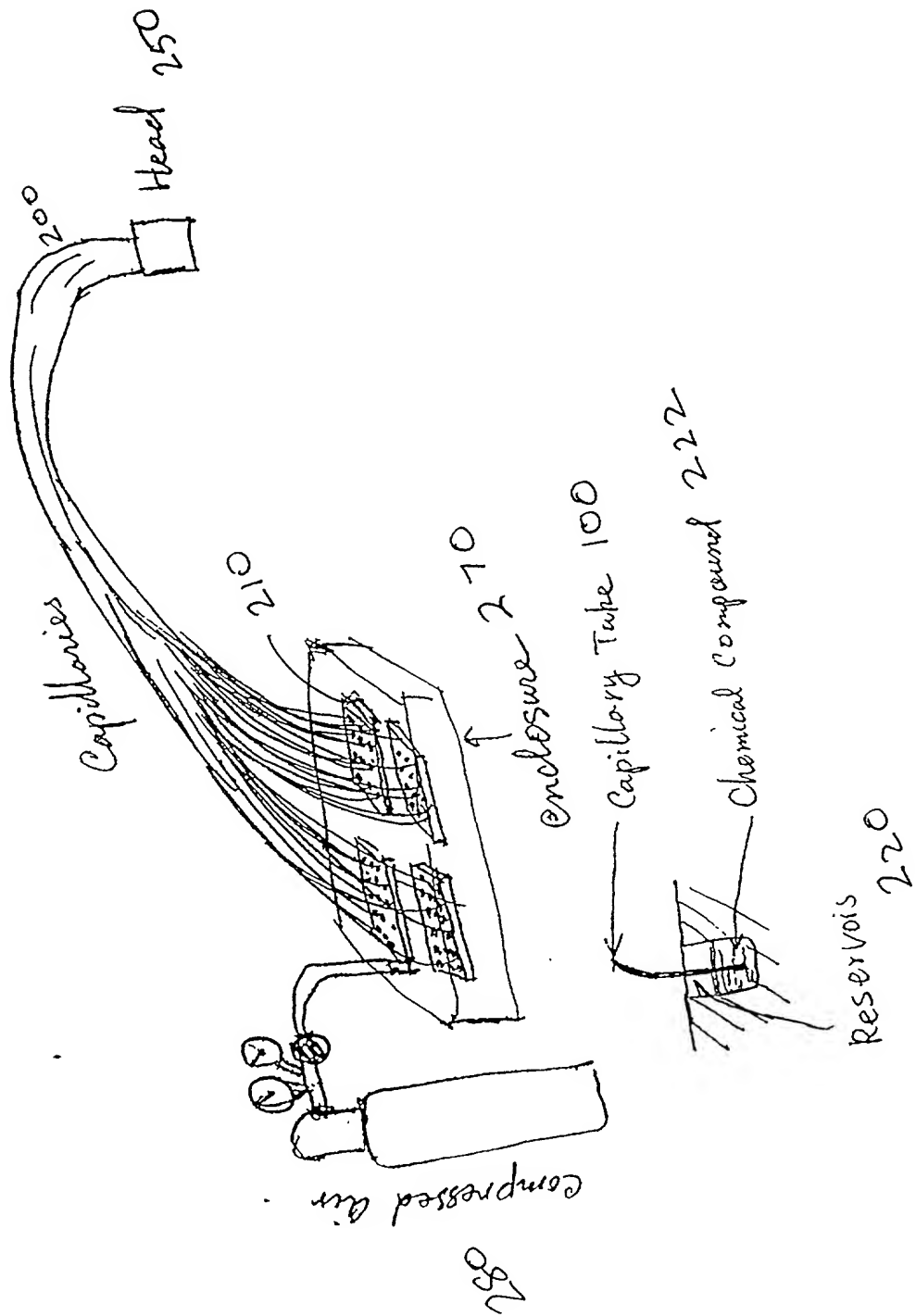


Figure 1

Fig. 2A



XHTS

-- Microarrays and Fiber Bundles

Imaging

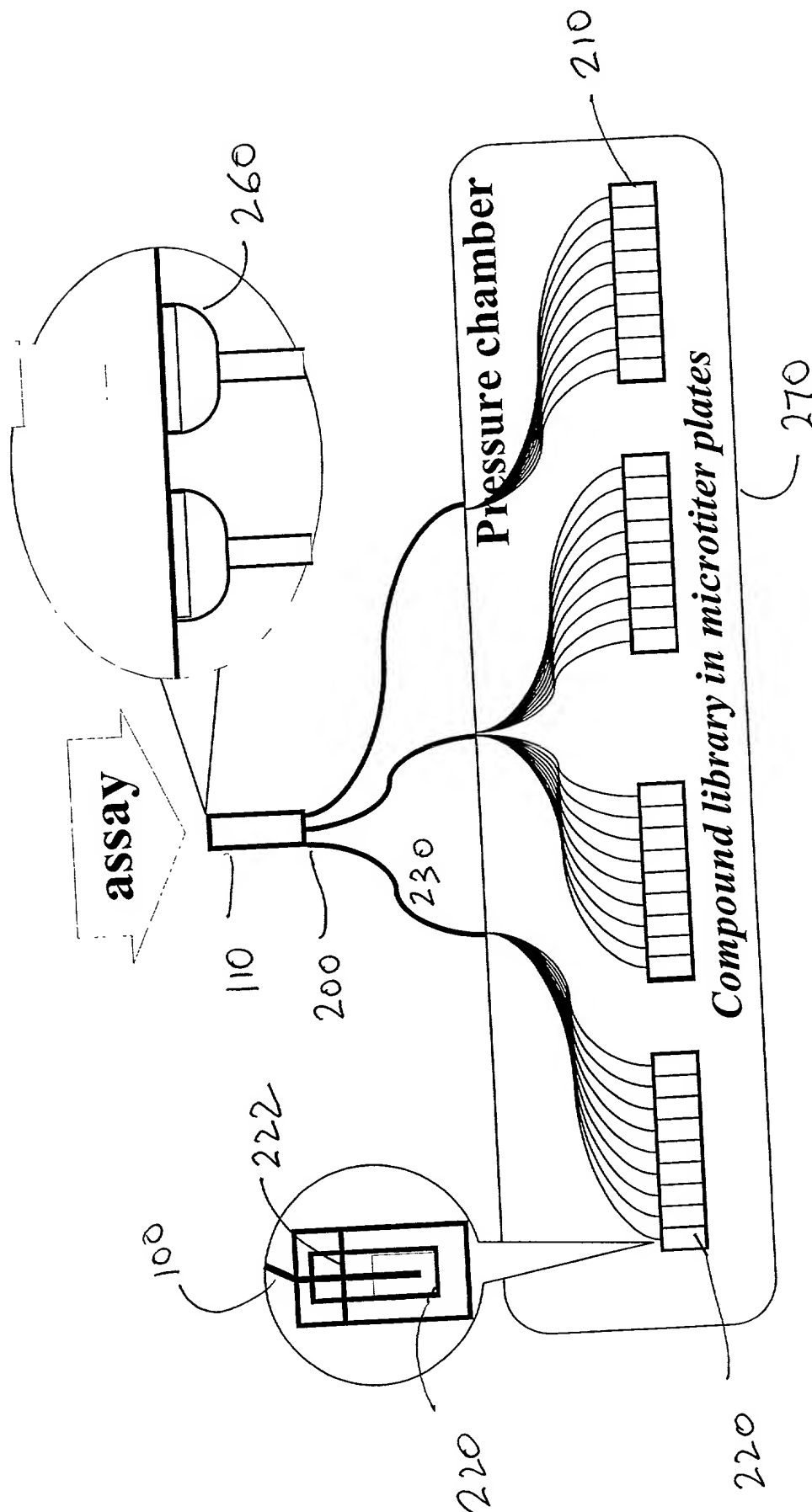


FIG. 2B

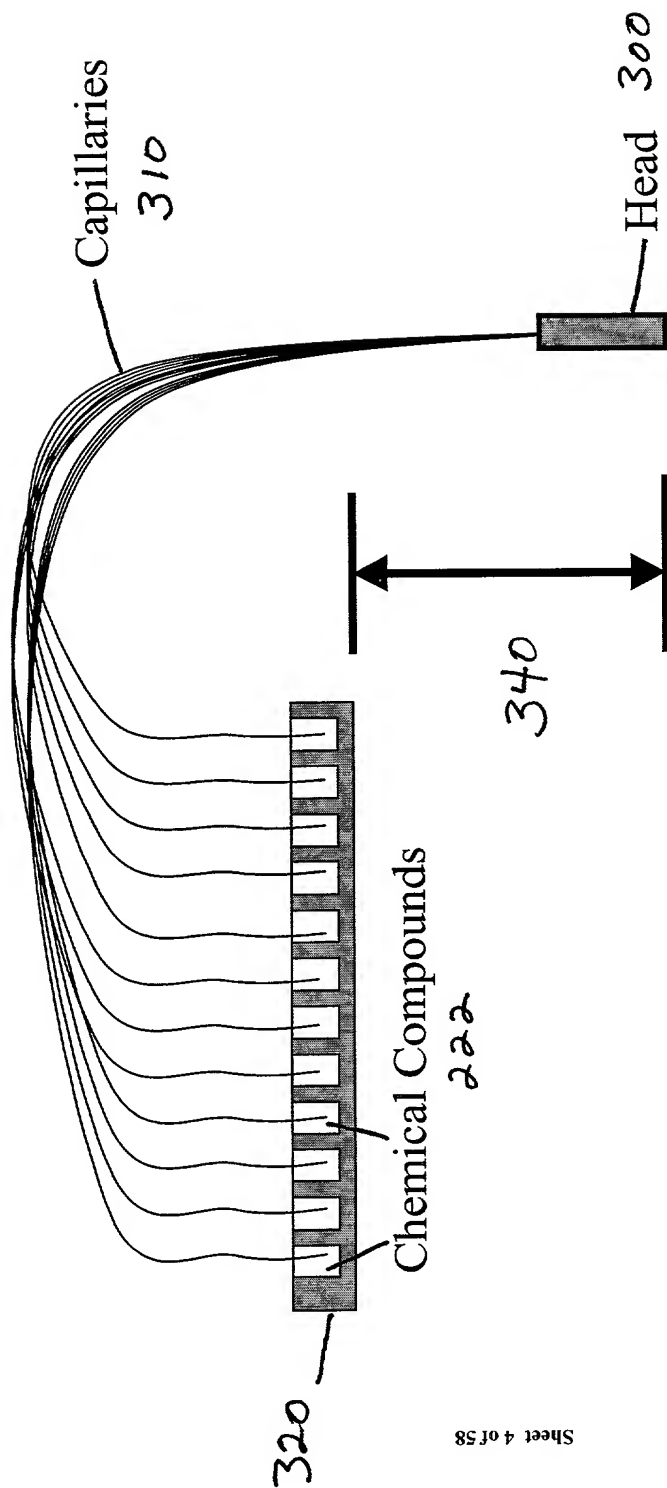
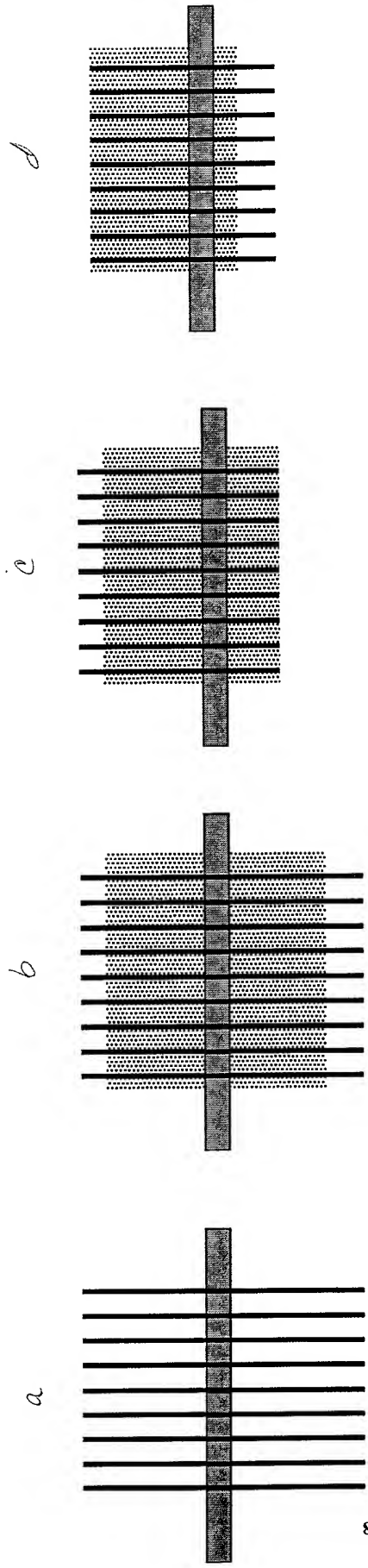


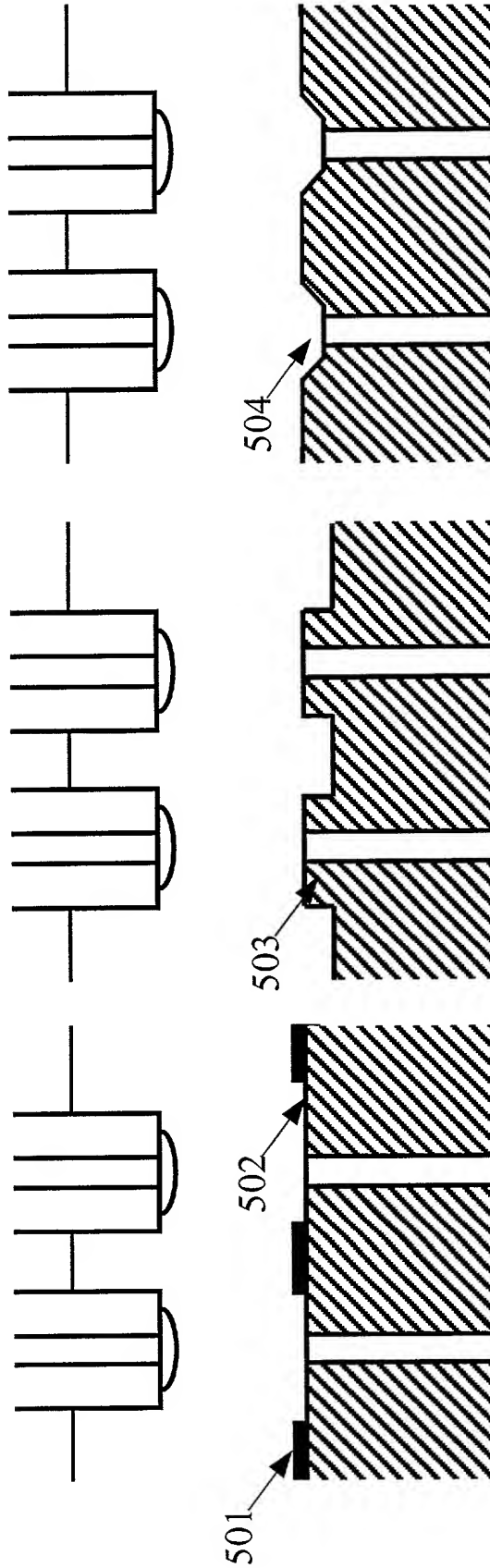
Figure 3



Sheet 5 of 58

Fig. 4. Fabrication of delivery head using a guide plate

Delivery head



(a)

(b)

(c)

Capillary array compound library

- 501 – Hydrophobic coating
- 502 – Hydrophilic coating
- 503 – Island
- 504 - Well

Fig. 5. Surface features on the surface of the capillary array compound library to prevent cross-contamination during compound loading

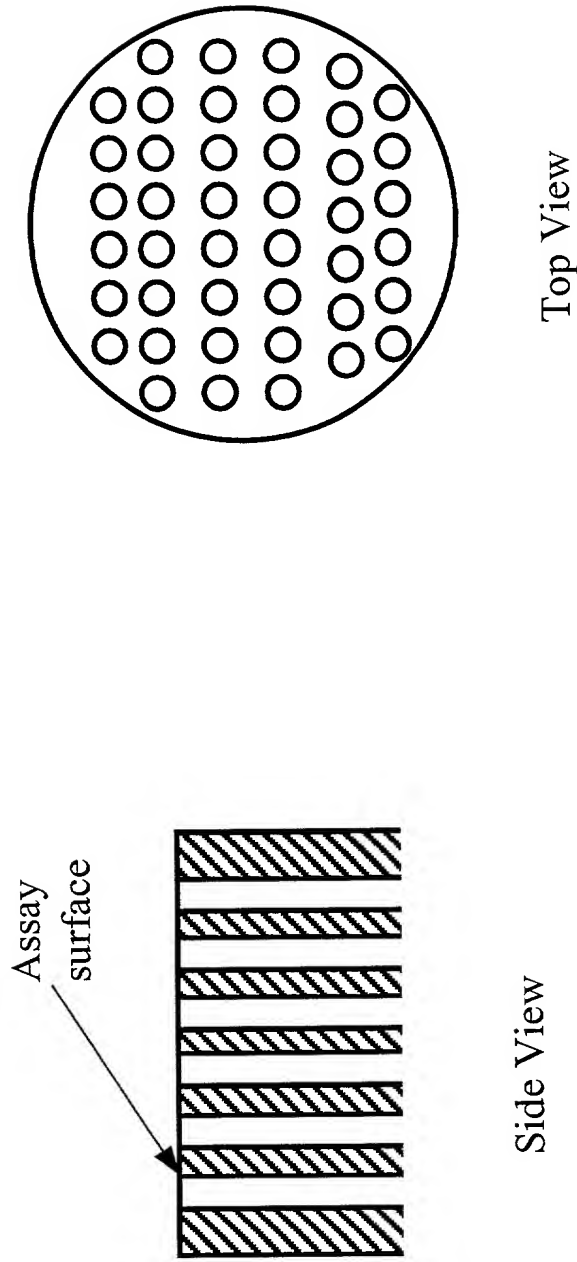
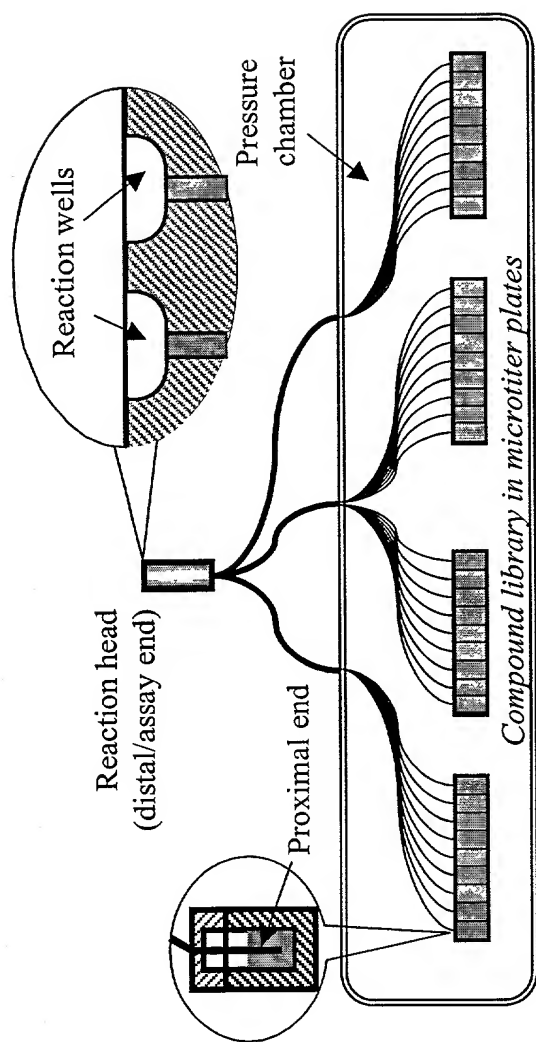
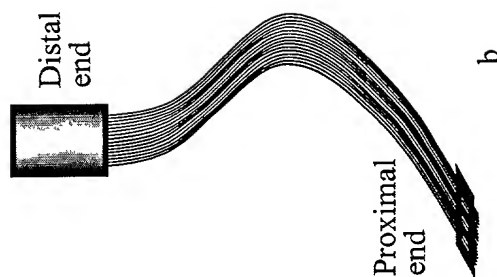


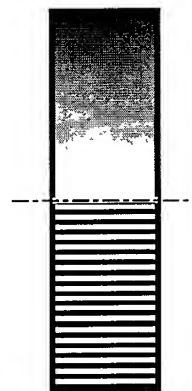
Fig. 6. Basic configuration of capillary array substrate for the portable compound library



a

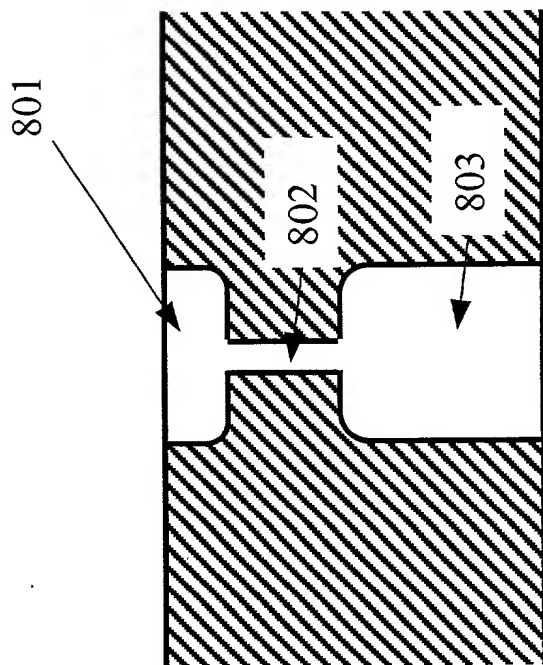


b



c

Fig. 7 The capillary array compound library in different formats



- 801 – Mixing/reaction well
- 802 – Flow regulator for reagent metering
- 803 – Compound reservoir

Fig. 8. Internal structure of a through hole in capillary array compound library

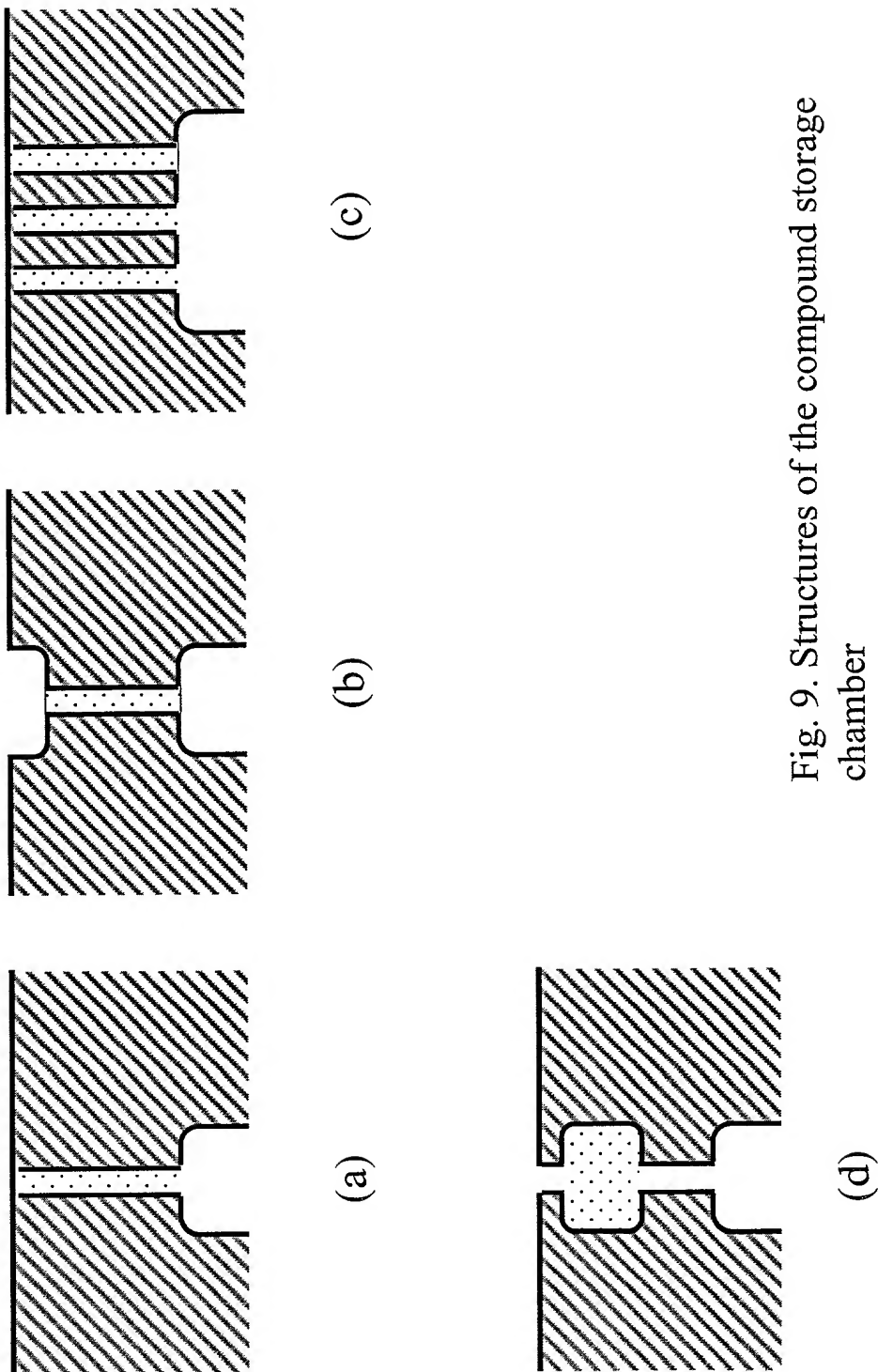


Fig. 9. Structures of the compound storage chamber

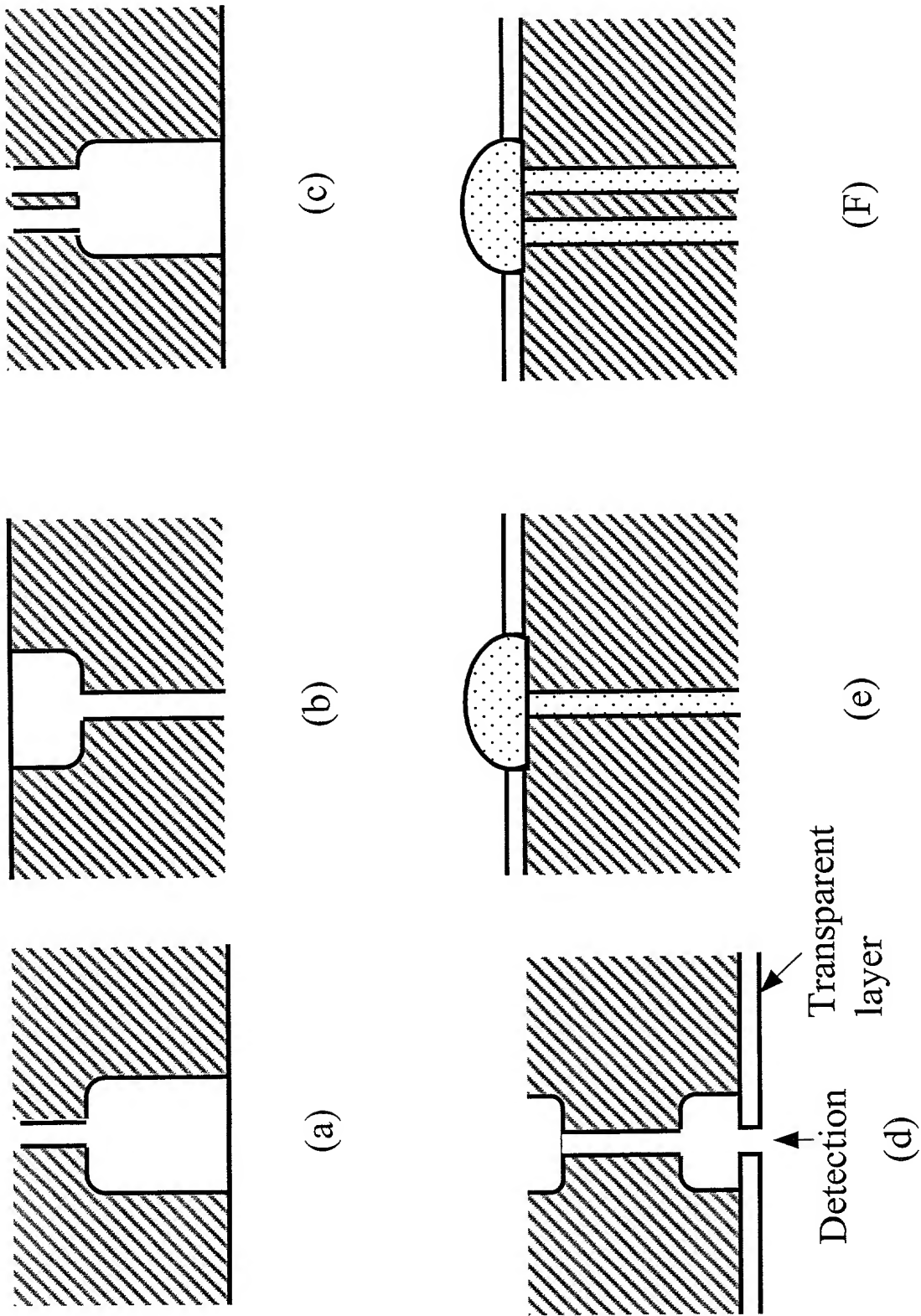
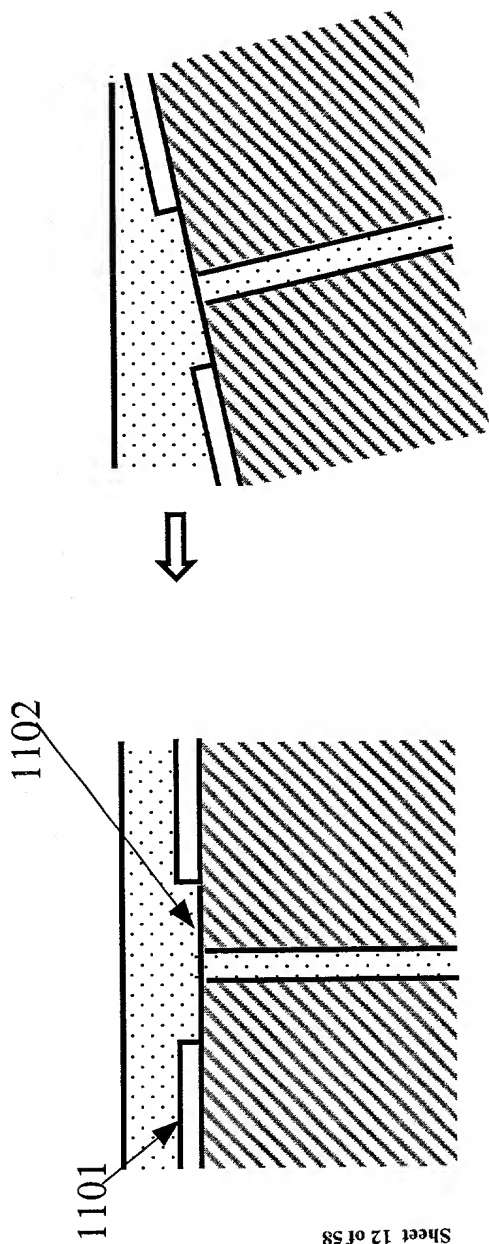
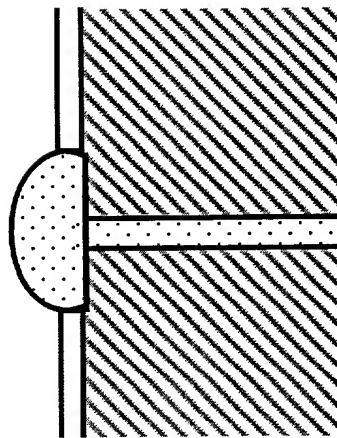


Fig. 10. Internal structures of mixing/reaction chamber



(a)

(b)



(c)

1101 – Hydrophobic coating
1102 – Hydrophilic coating

Fig. 11. Volume metering by surface tension patch

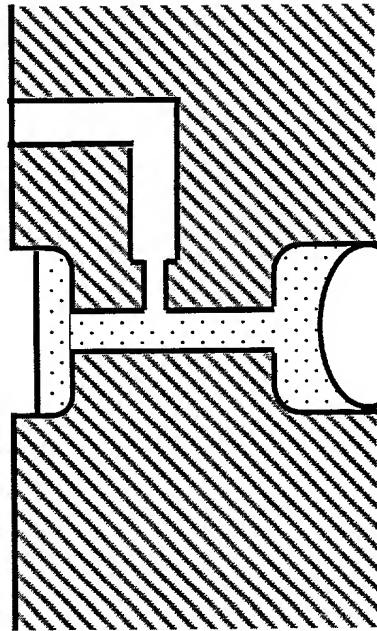


Fig. 12. Fluid regulator with side air tunnel

Fig. 13 Internal through hole structures to facilitate chamber volume metering and mixing

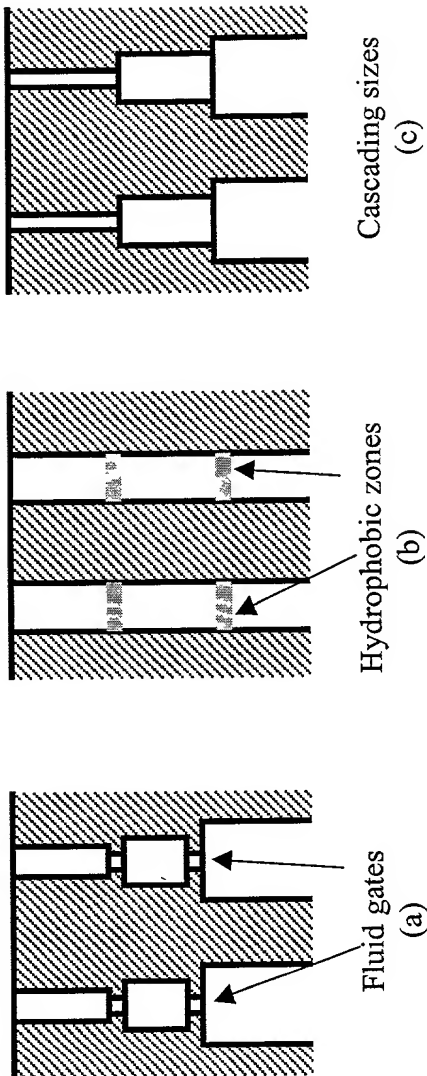


Fig. 14 Process of metering multiple reagents using interconnected chambers

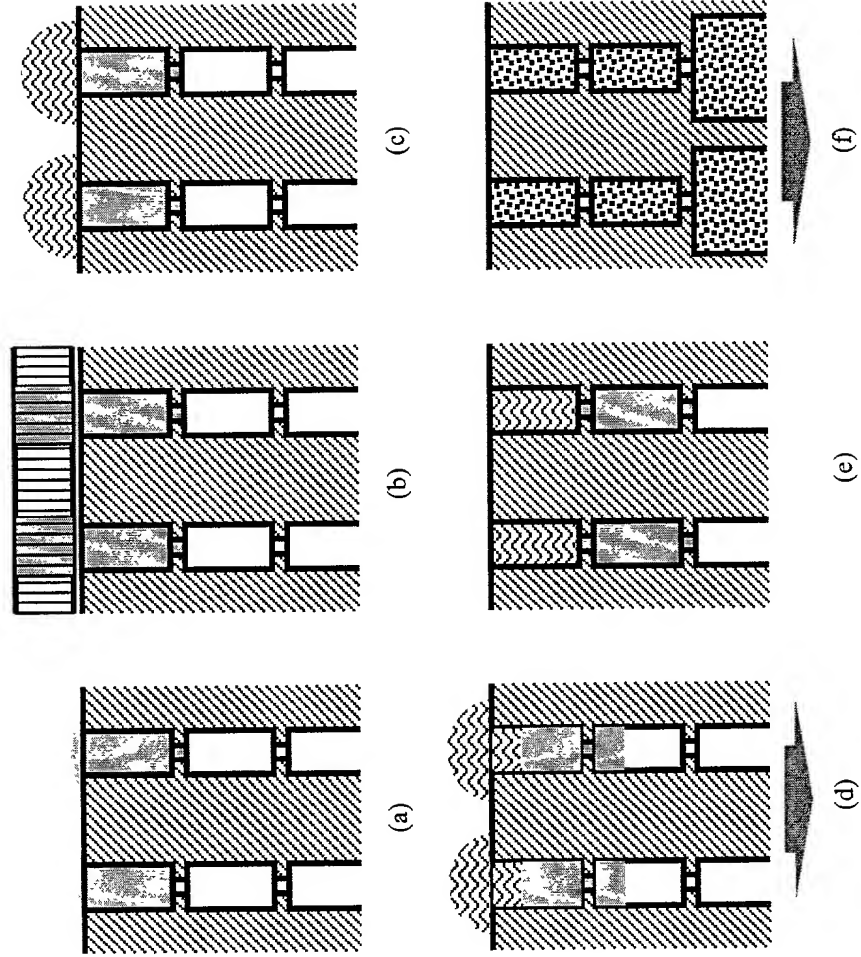
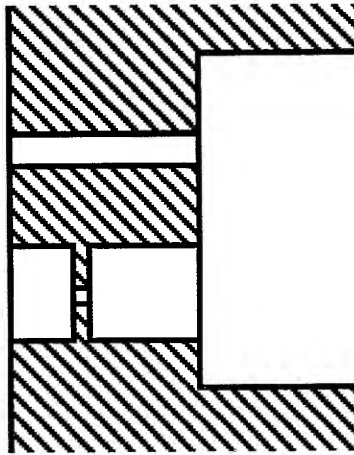


Fig. 15 Special through hole structure where multiple chambers links to a chamber in parallel



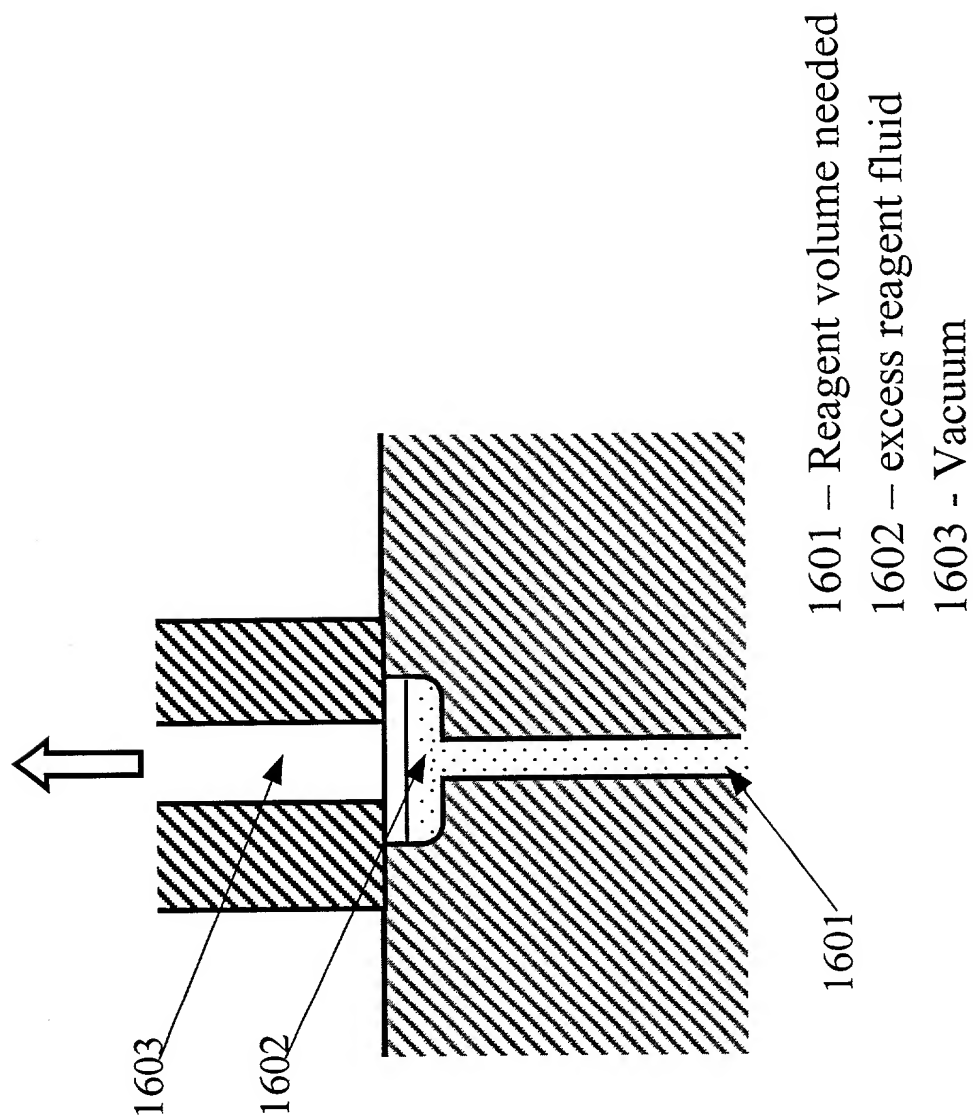


Fig.16. Removal of excess fluid by vacuum

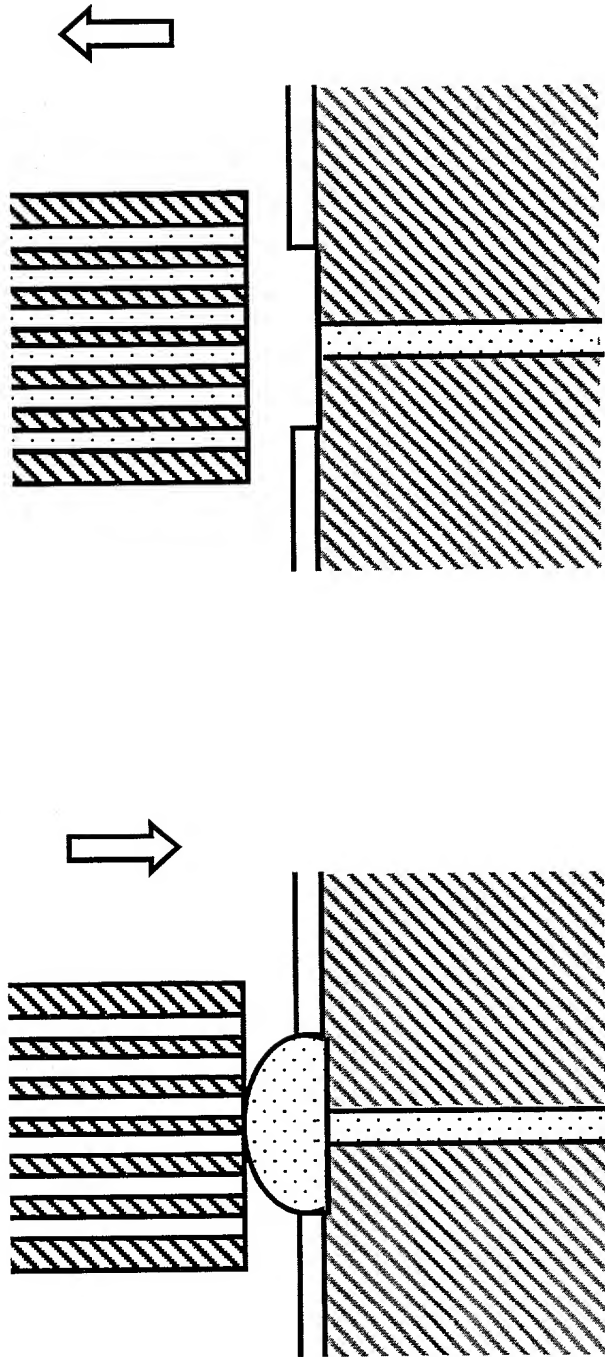
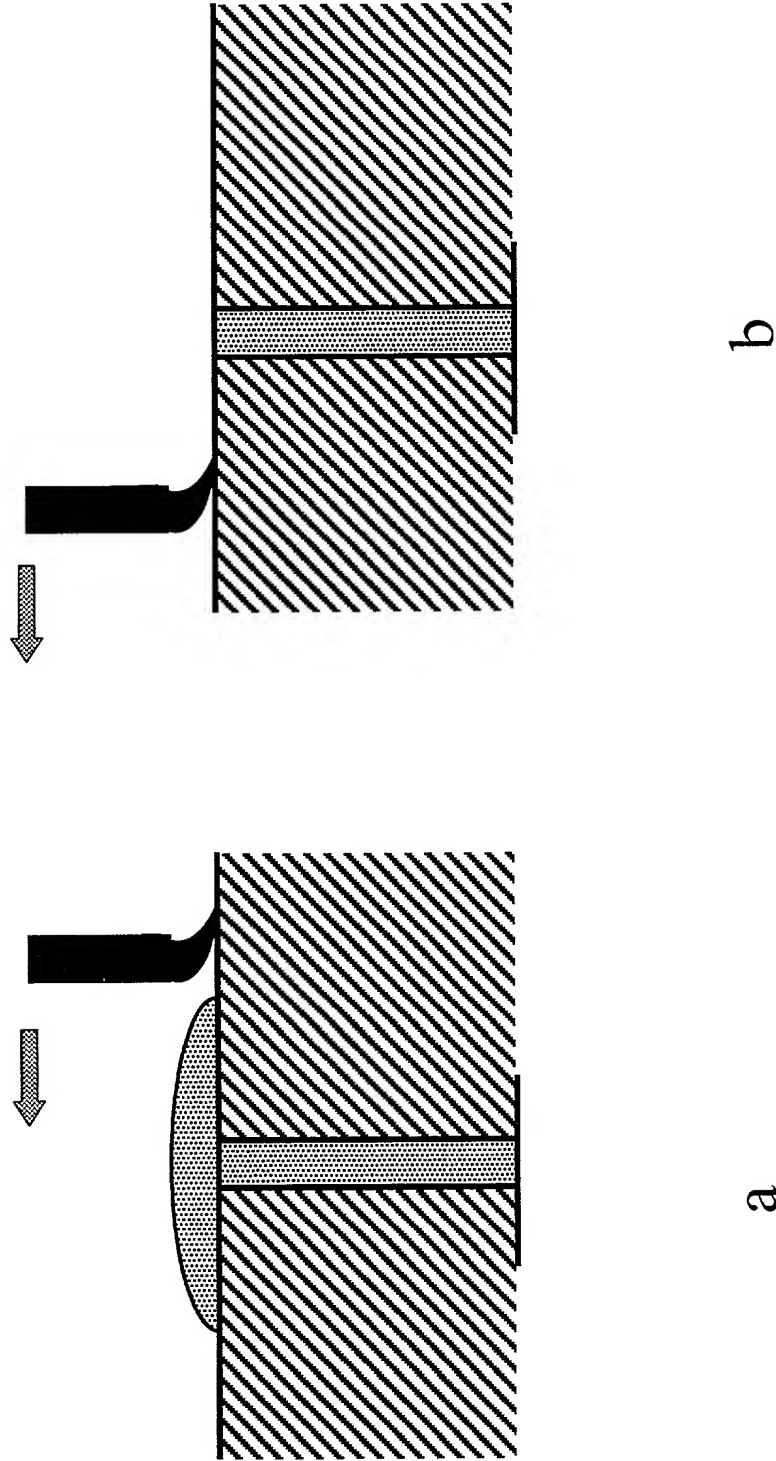


Fig. 17. Excess fluid removal using a second capillary array

Fig. 18. Excess Fluid Removal by Wiping



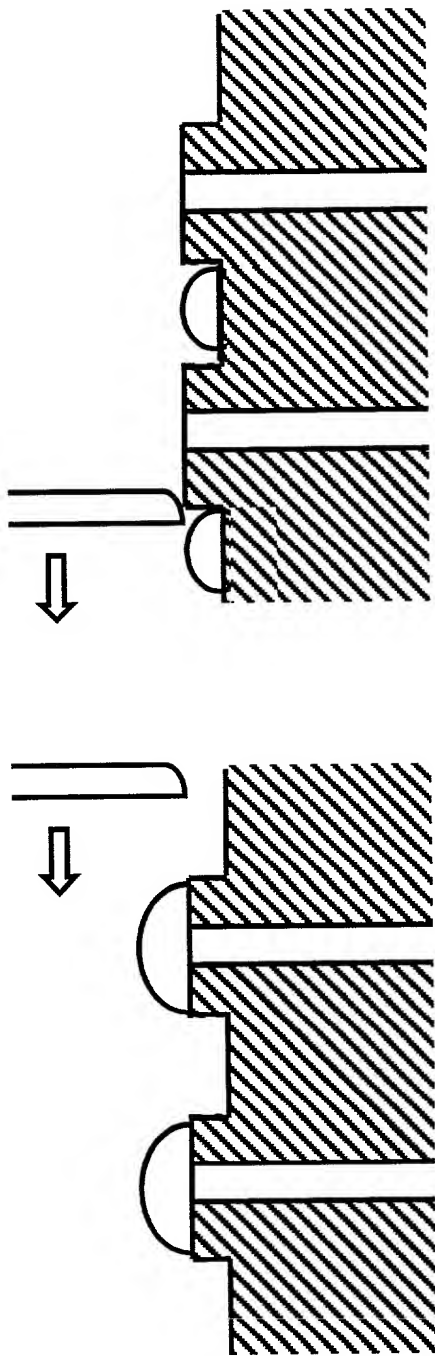
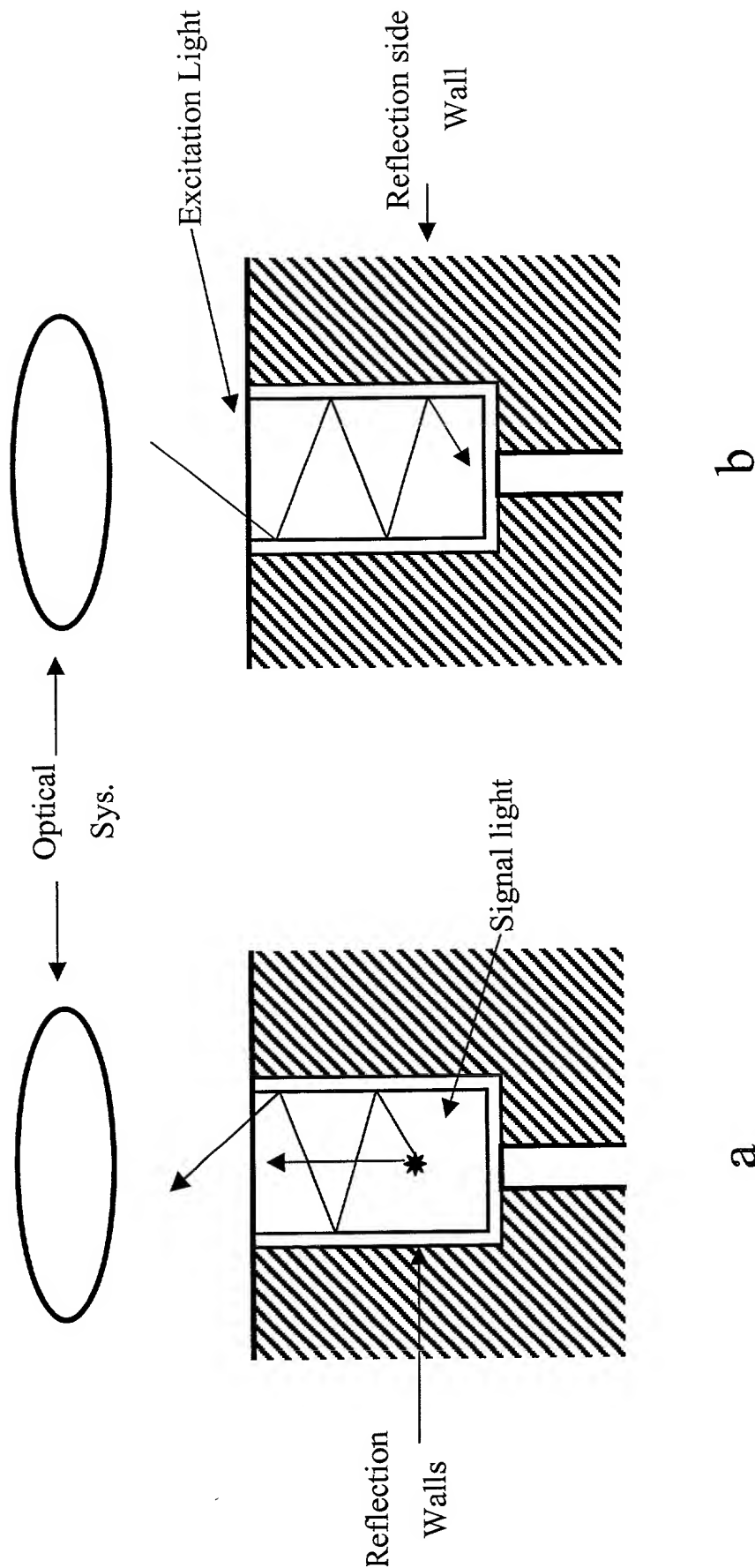


Fig.19. A method for reducing cross-contamination between adjacent holes during excess fluid removal

Fig. 20 Use Reflection Wall of Reaction Chamber to Enhance Optical
Signal of the Assay



2061204208001

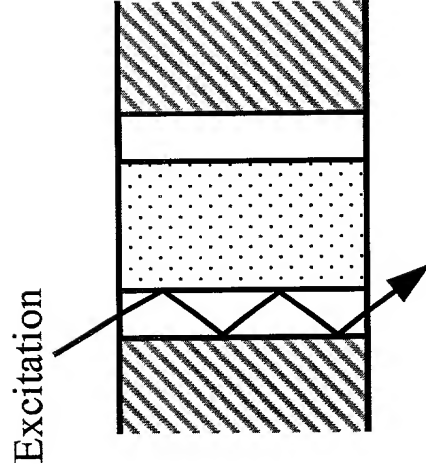
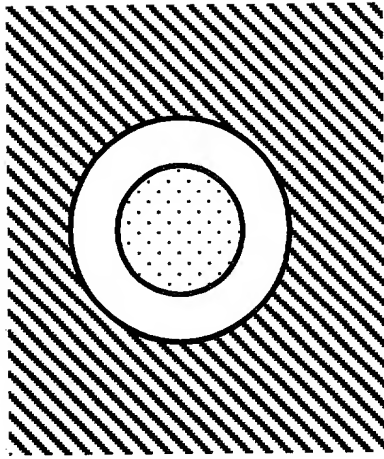
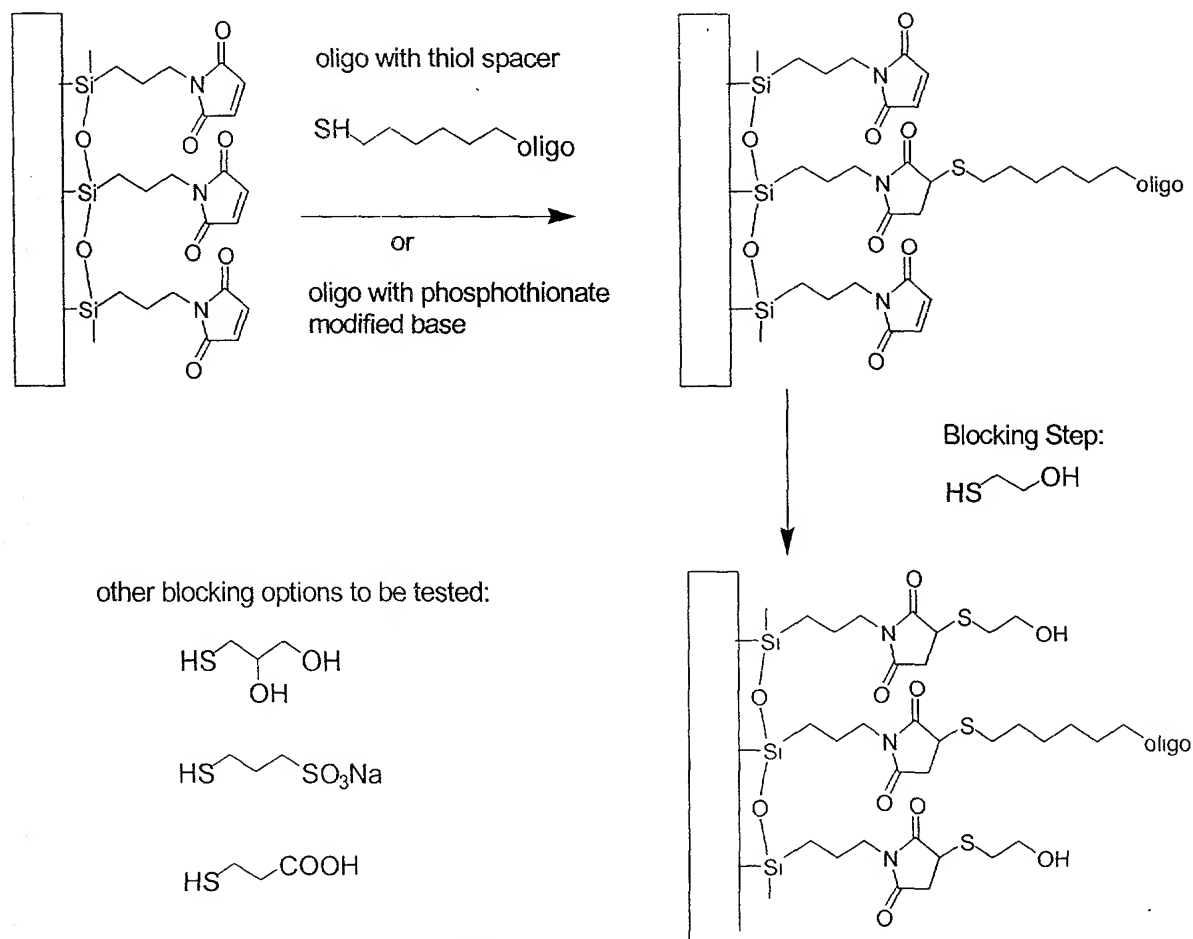
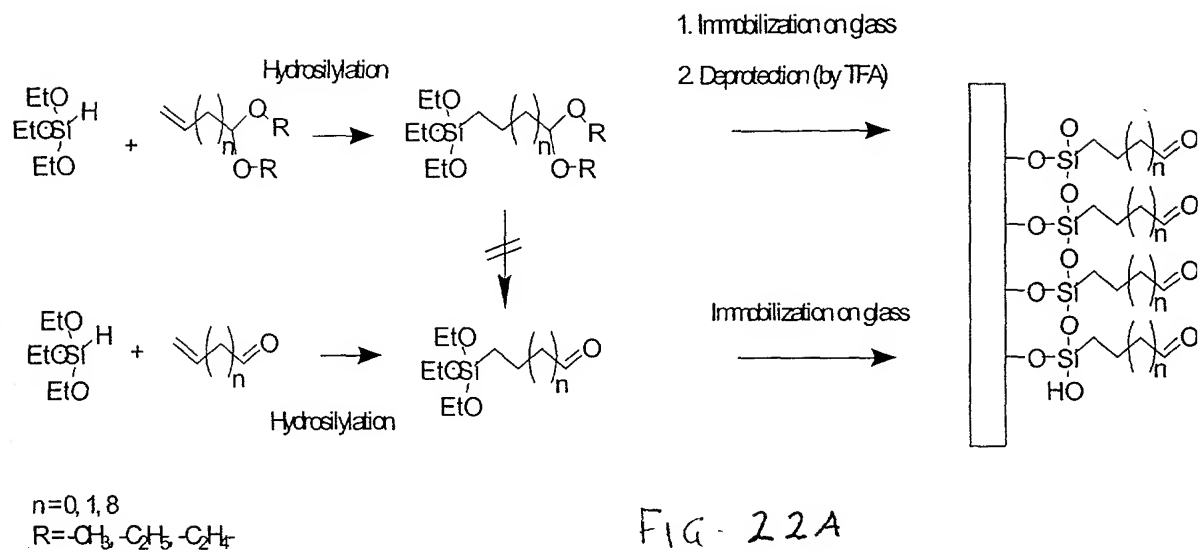


Fig21 Light guiding capillary



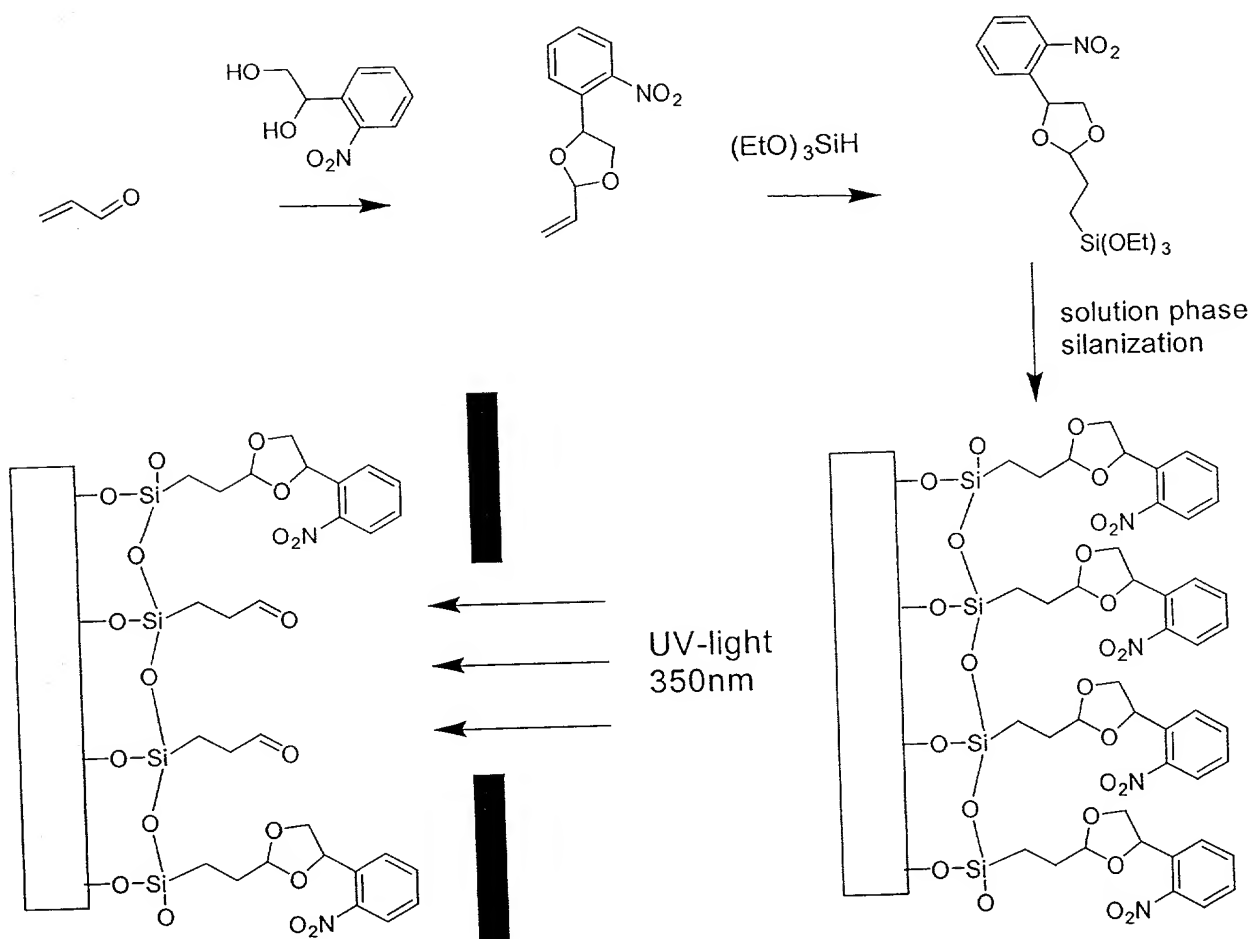


FIG. 22C

Figure 23 Process for fabrication using a negative mask

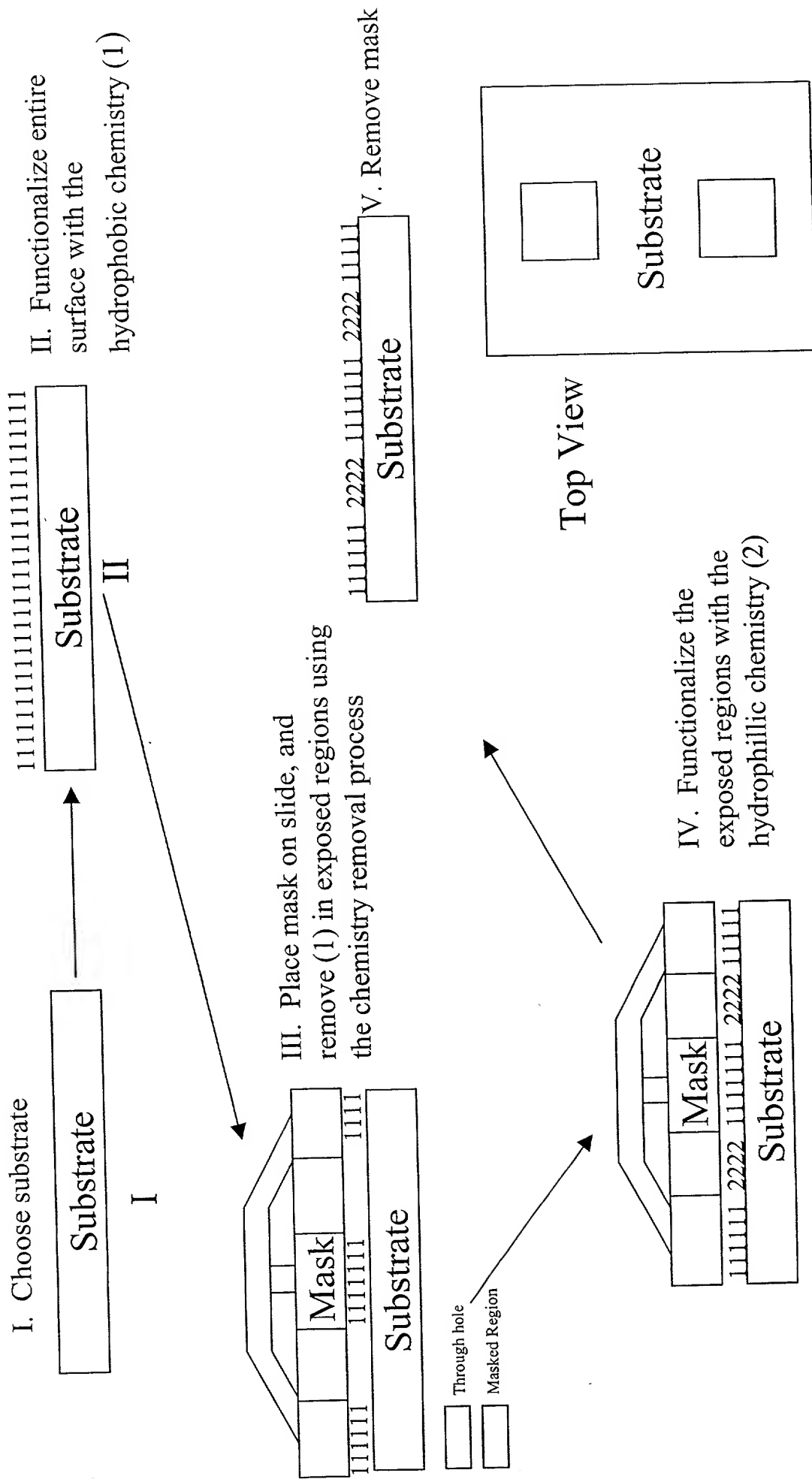


Figure 24 Process for the fabrication using positive mask

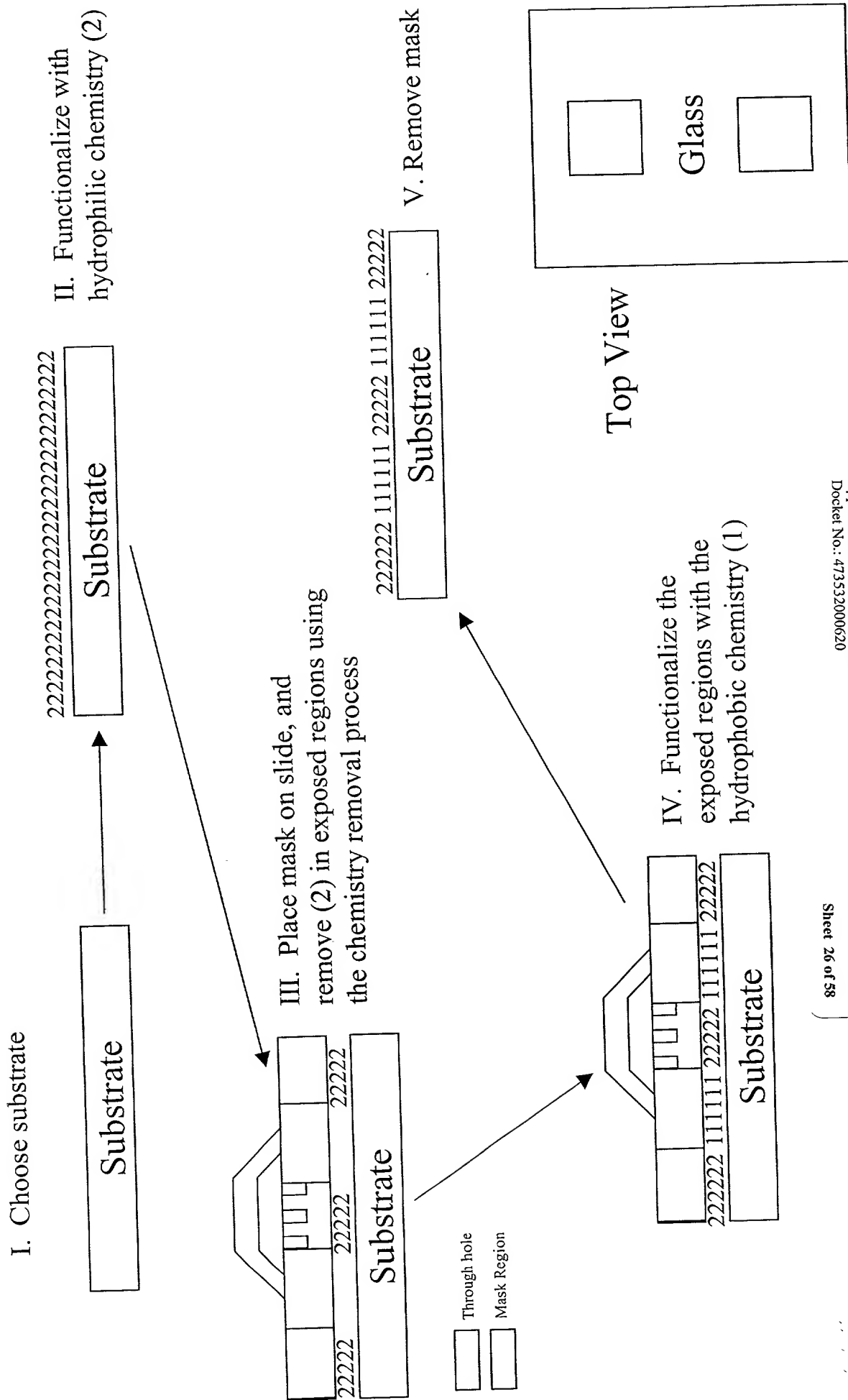


Figure 25 Chamber use

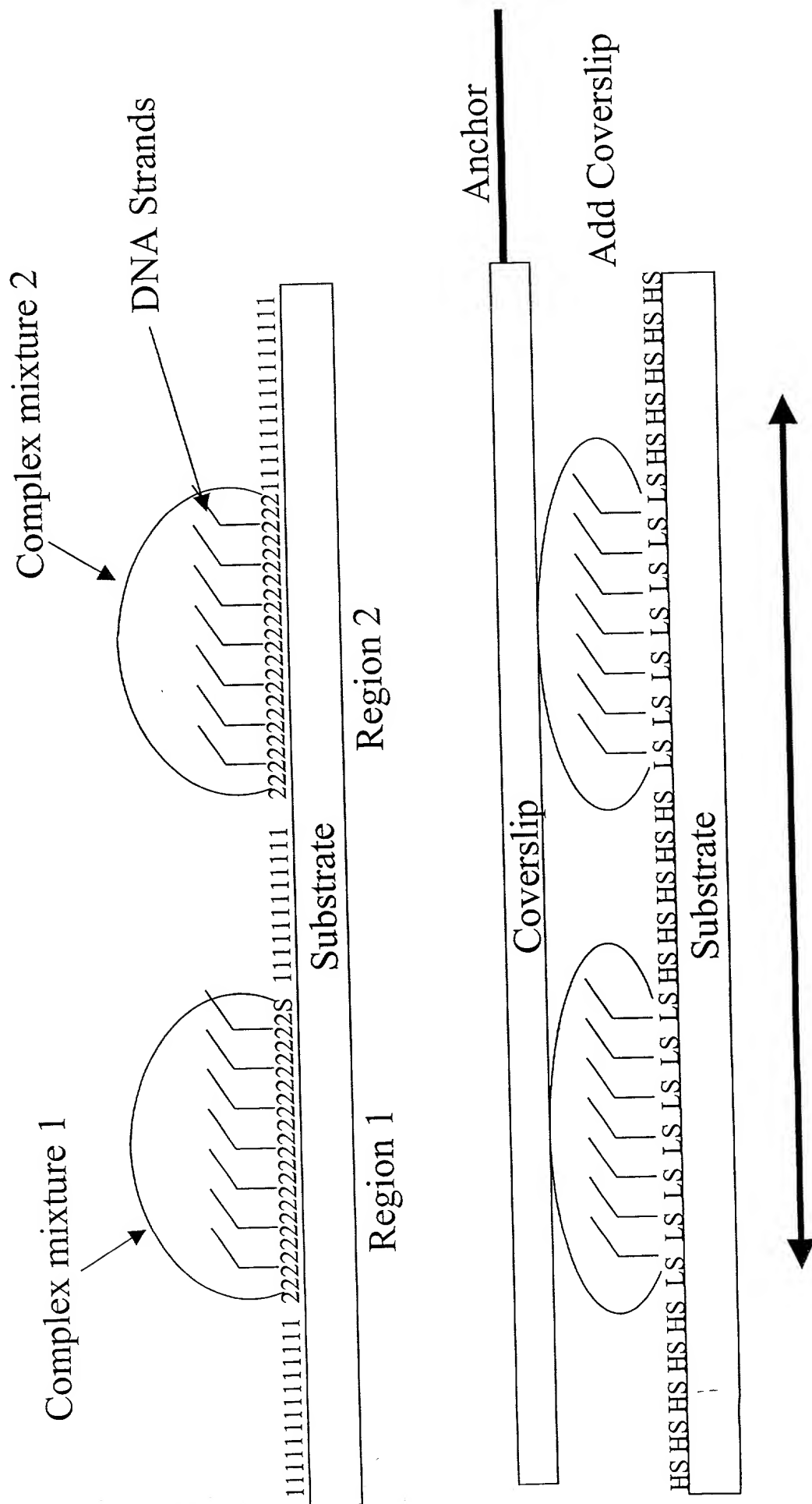
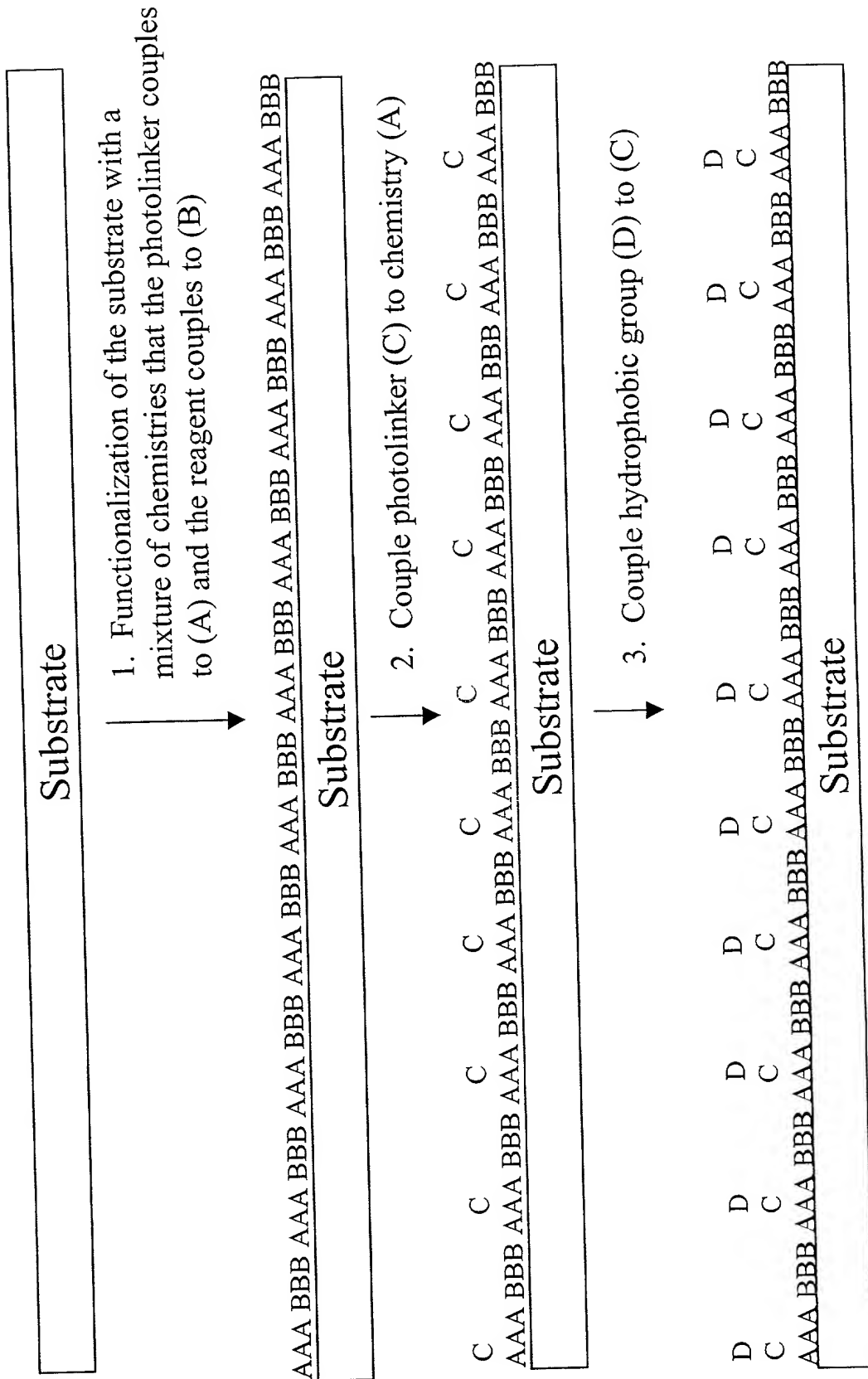


Figure 26A Surface Tension Patterning: On-capillary Fiber optic based patterning



206T20-4208007

Figure 26B Surface Tension Patterning: On-capillary Fiber optic based patterning

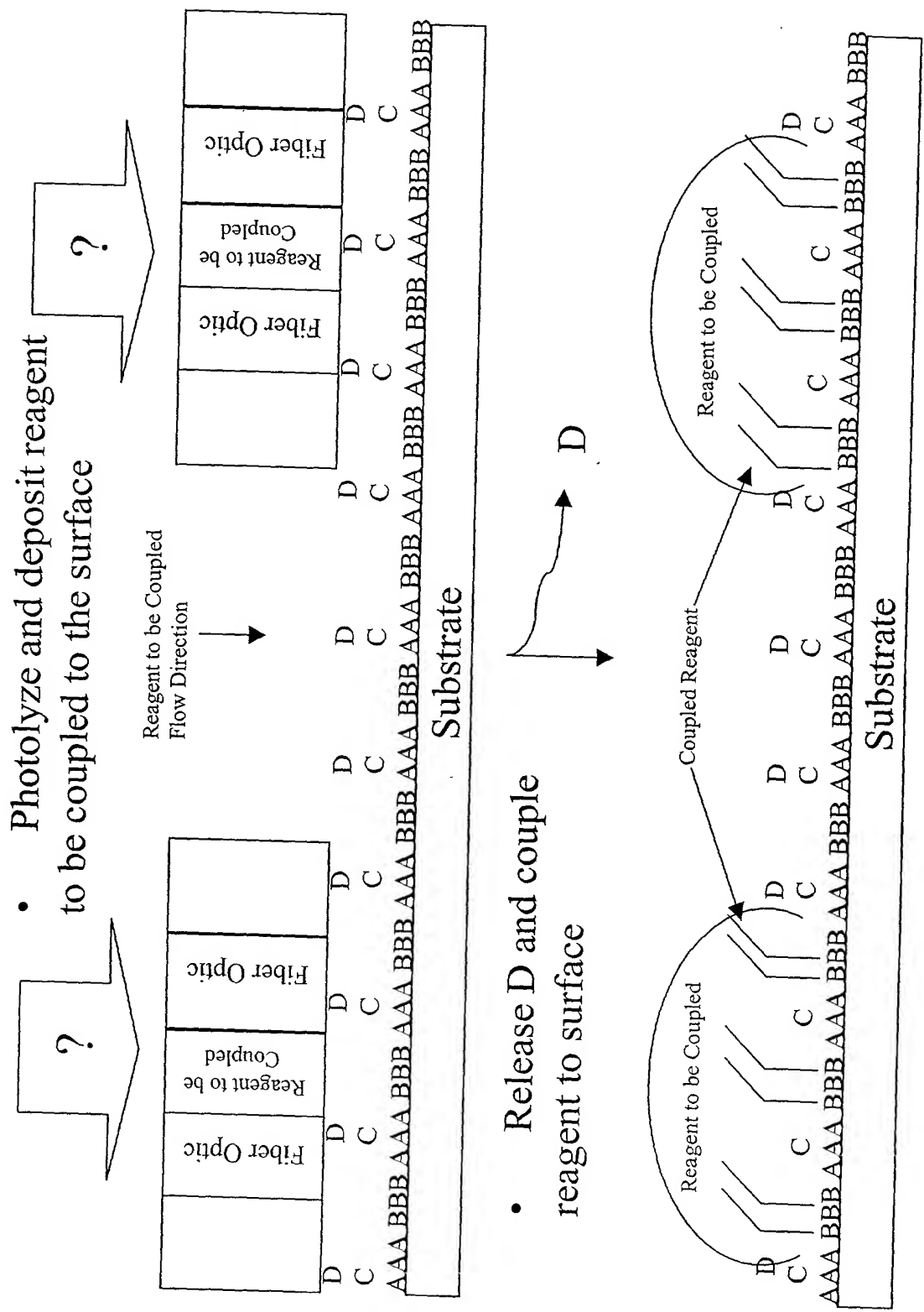
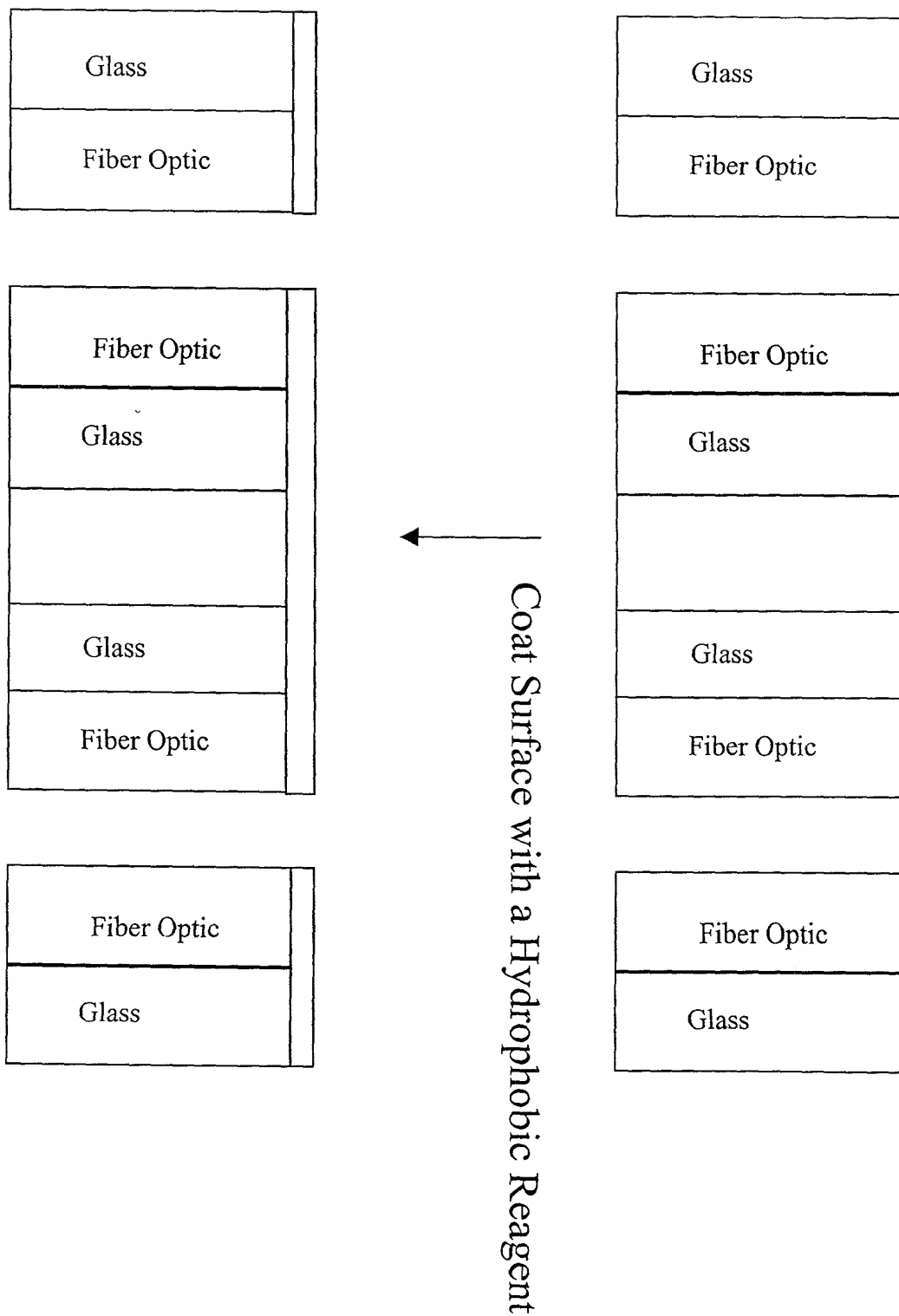


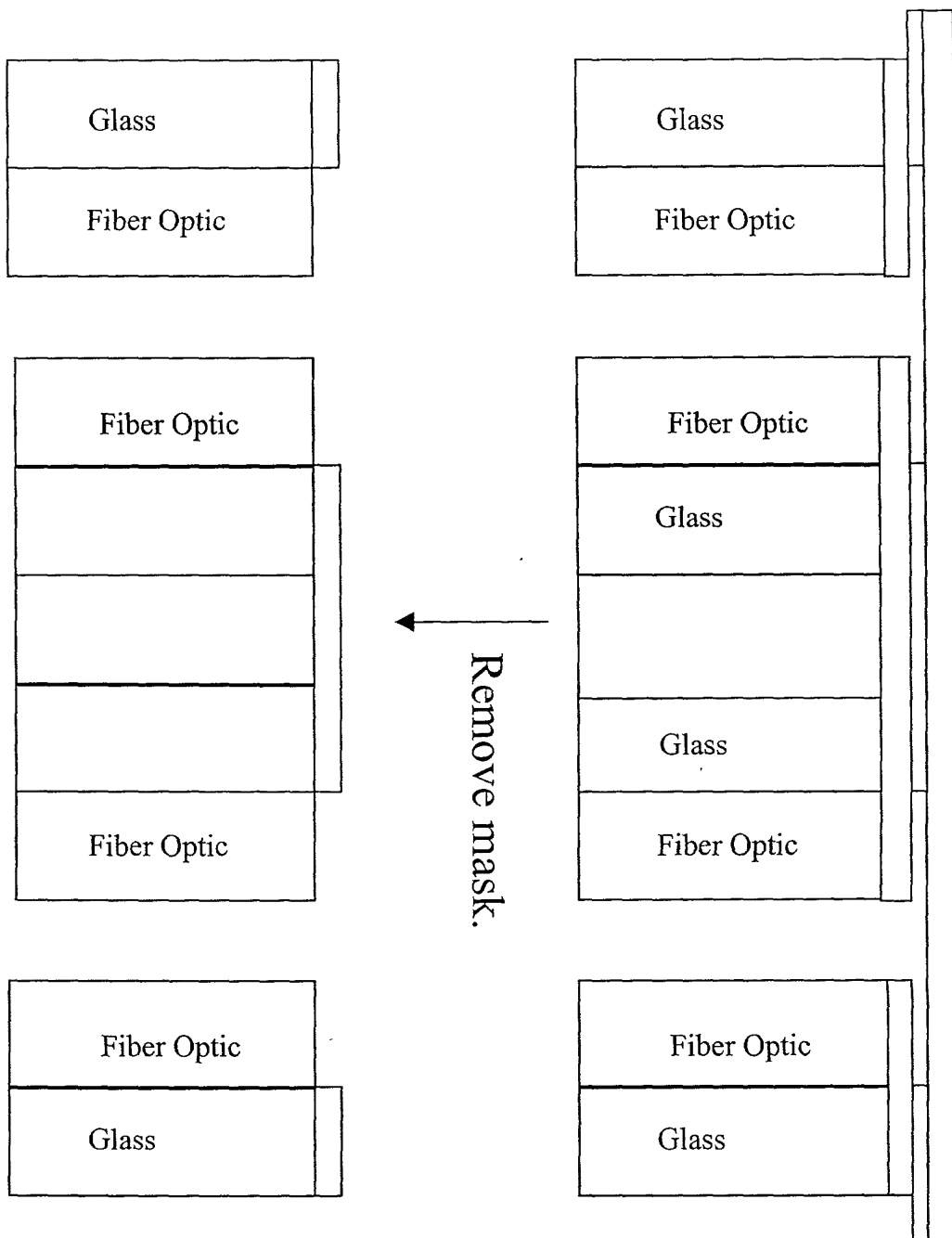
Figure 27A Volume Metering using Surface Tension Features



10080074.031502

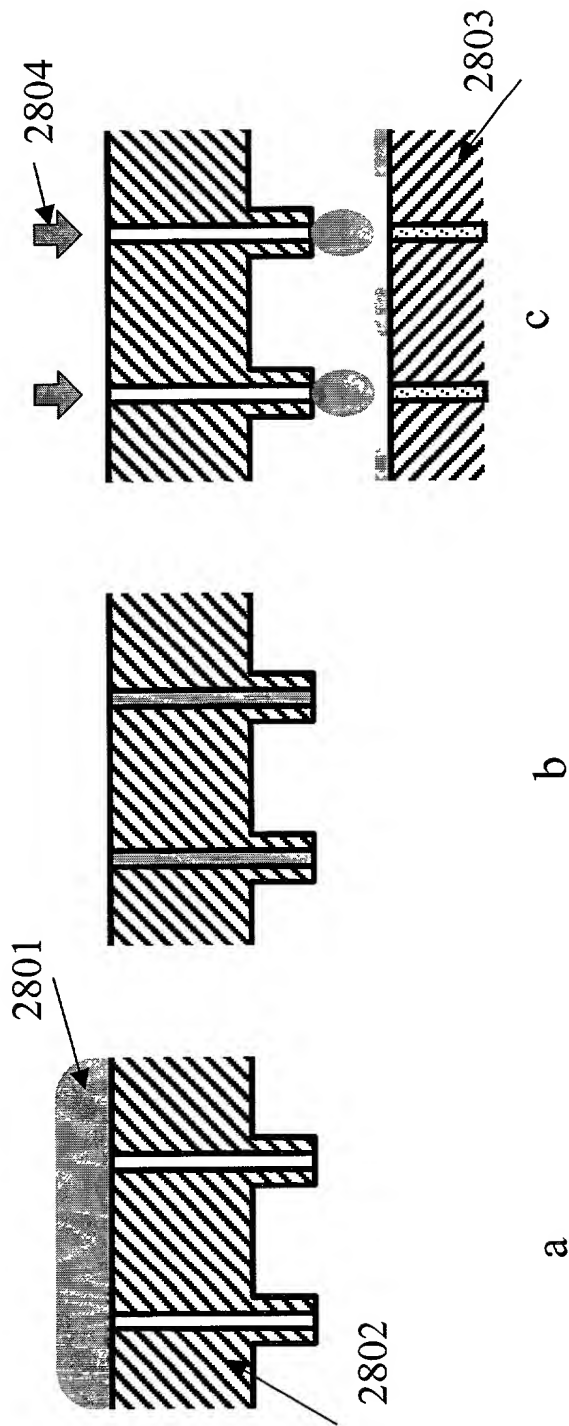
Figure 27B Volume Metering using Surface Tension Features

Place a Mask on to the Surface and Expose the Surface to the Chemistry Removal Process



10080274.021902

Fig. 28 Reagent pre-metering using an intermediary through-hole array



2801 - reagent fluid applied in excessive;
 2802 - intermediary through hole array;
 2803 - capillary array compound library;
 2804 - pressure

Fig. 29 Metering and mixing with a multi-use capillary array
compound library

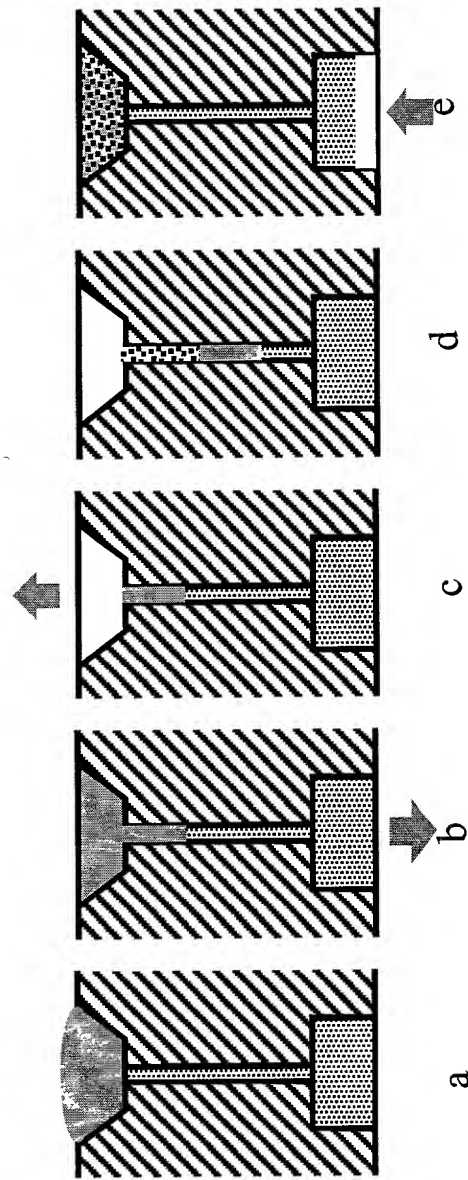


Fig. 30 Metering with hydrophilic patch and mixing

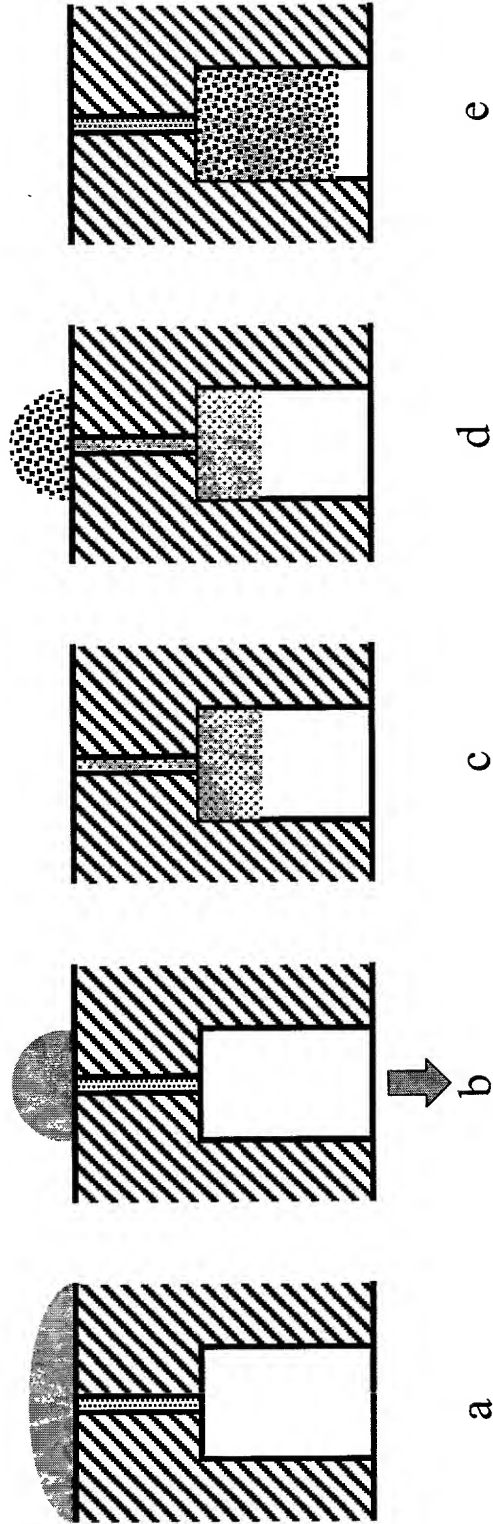


Fig. 31 Mixing and metering with interconnected chambers

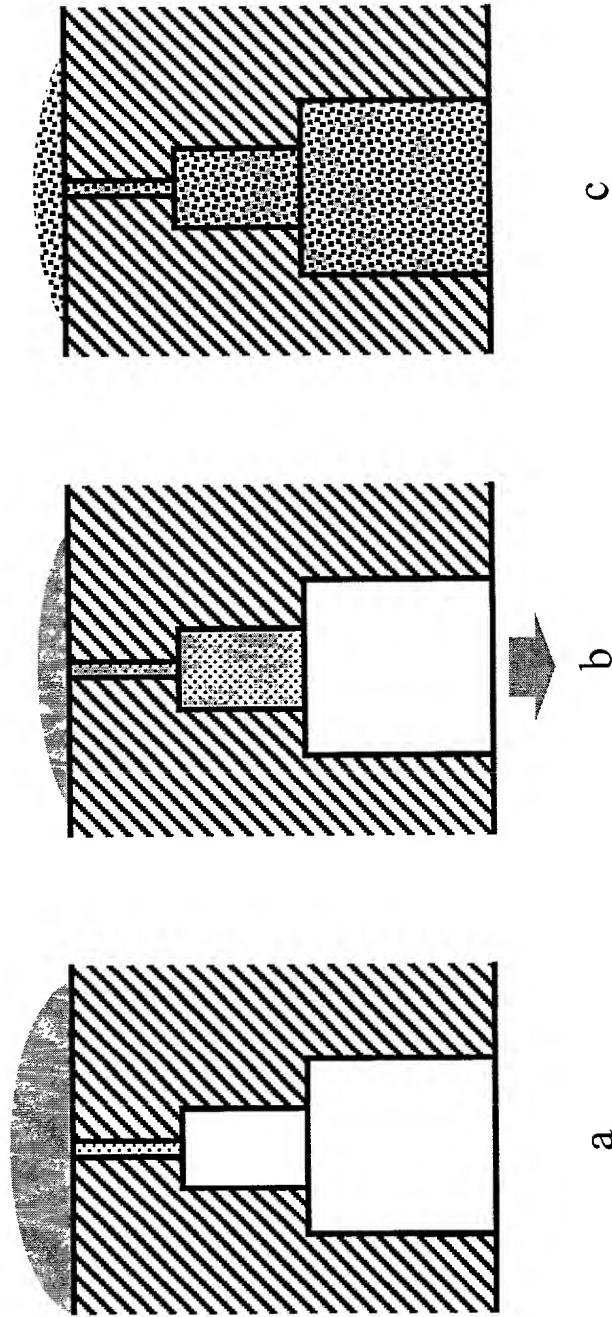
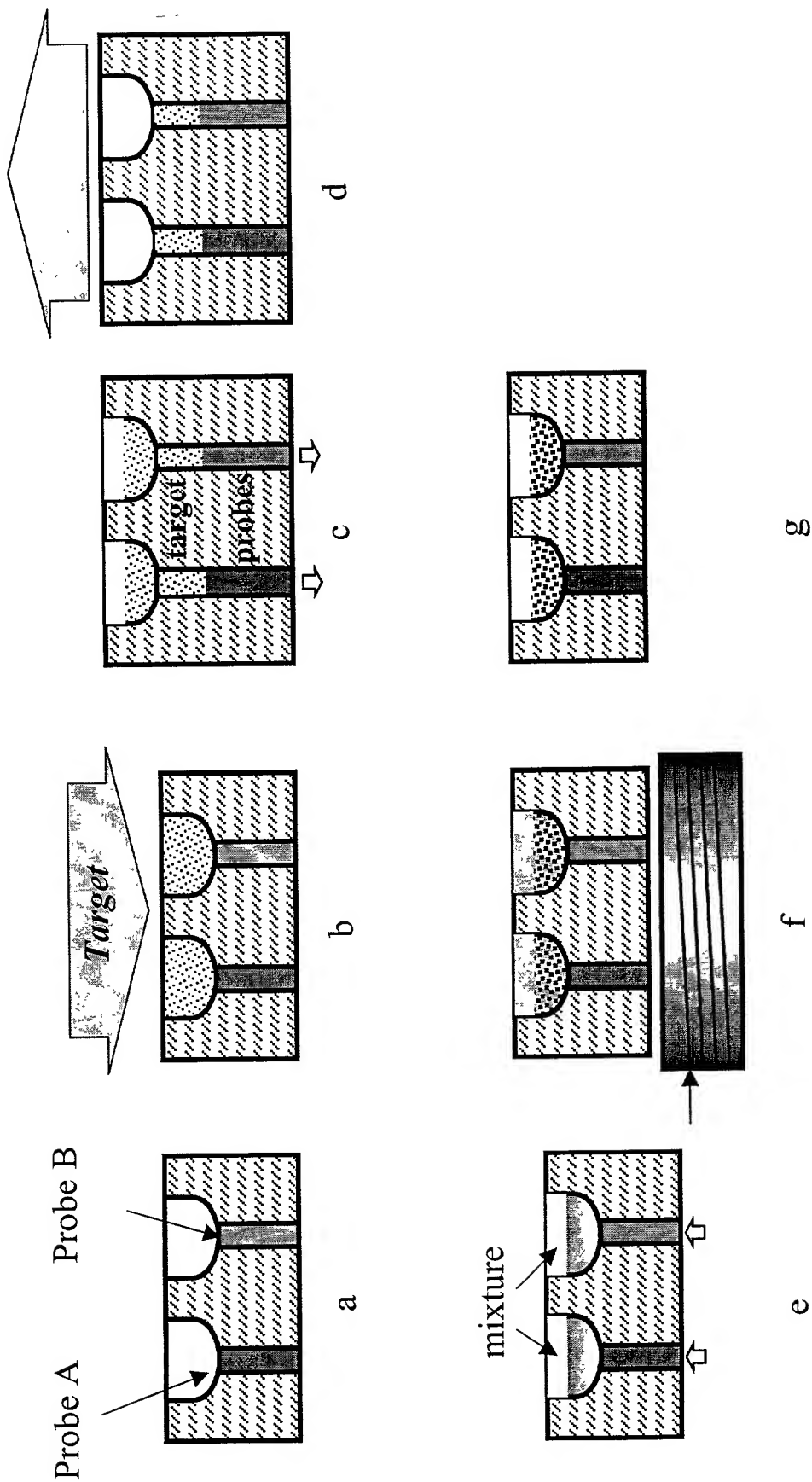


Fig. 32 Heterogeneous Assay

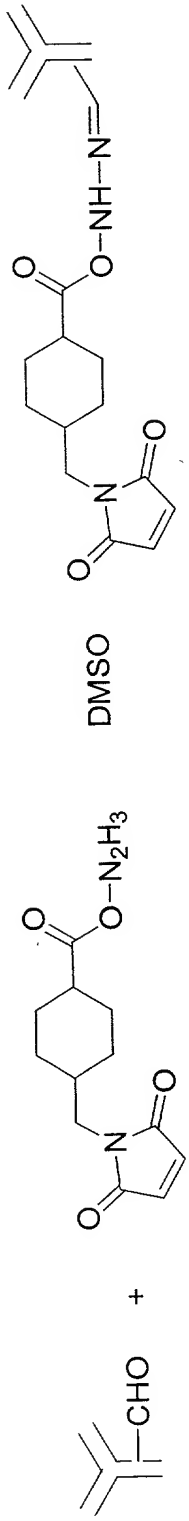


Antibody Immobilization via the Carbohydrate Moiety

1. Oxidation of antibodies vicinal diol group to its aldehyde



2. Conjugation of maleimide moiety with antibody



3. Immobilization of the modified antibody to the surface.

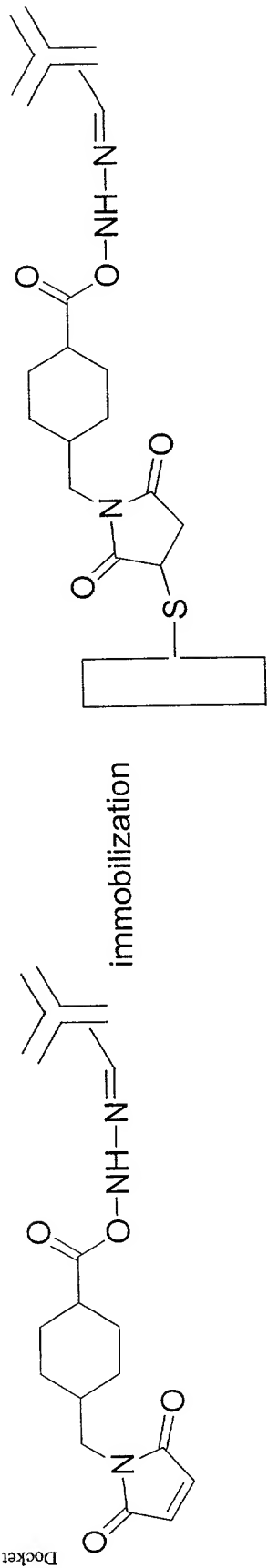
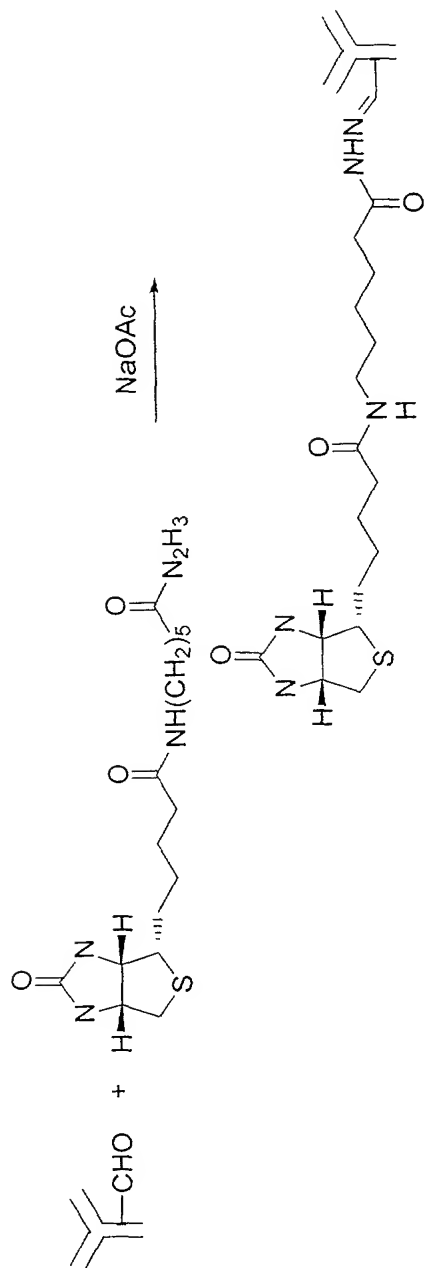


FIG. 33A

Antibody Immobilization via Streptavidin

1. Label antibody with biotin



2. Modification of fiber surface with biotin maleimide

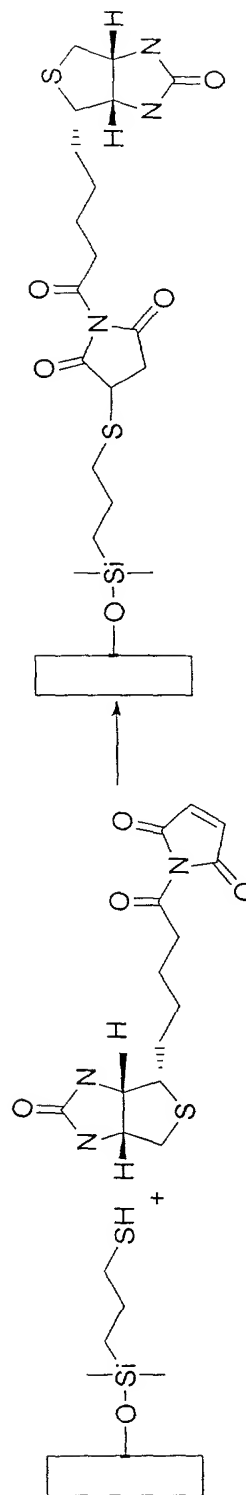
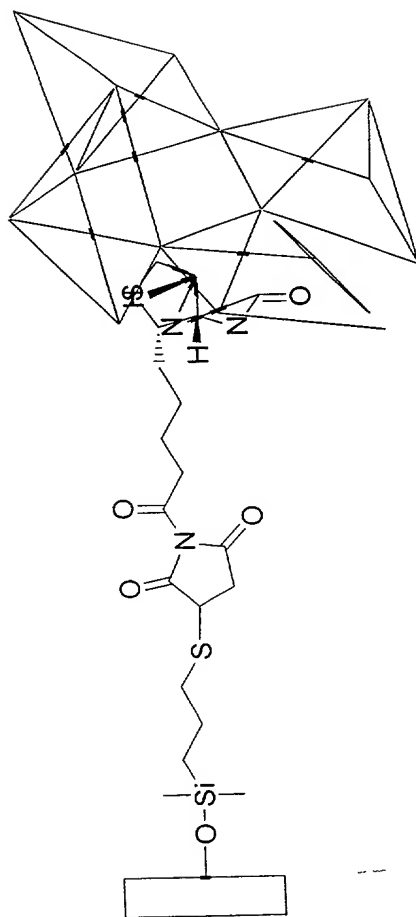


FIG 33c

Antibody Immobilization via Streptavidin

3. Conjugate Streptavidin to the surface



4. Conjugate Biotin Antibody to the surface

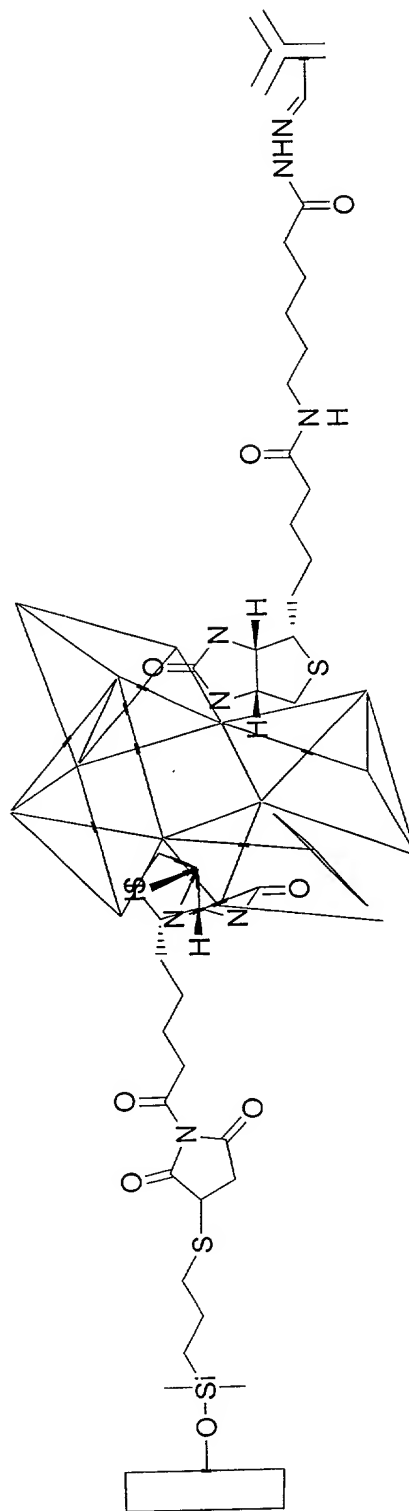
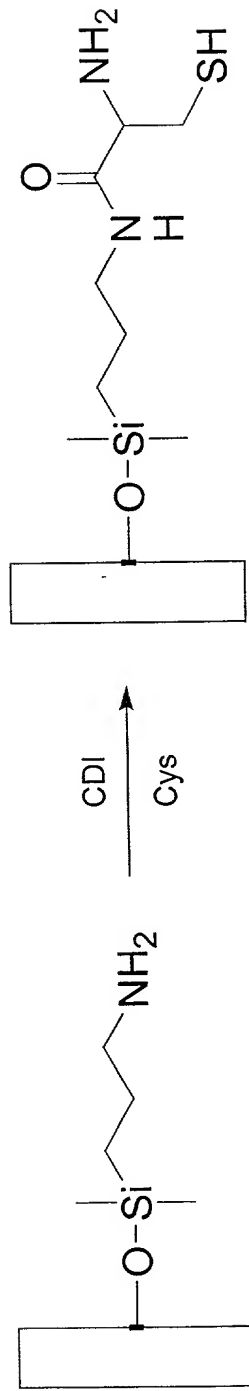


FIG. 33D

FIG. 33E Formation of thiazolidine

1. Surface attachment and formation of the linker



2. Thiazolidine formation

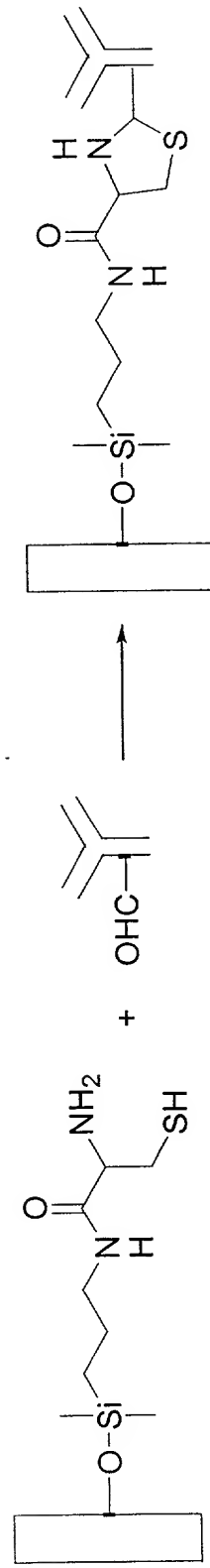


FIG. 33E

34



Figure 34 (cont. 1). Capillary Based Receptor Binding Assay: Non-equilibrium

Wash unbound ligand
and calculate total bound
using fiber optic base detection

Add saturating ligand

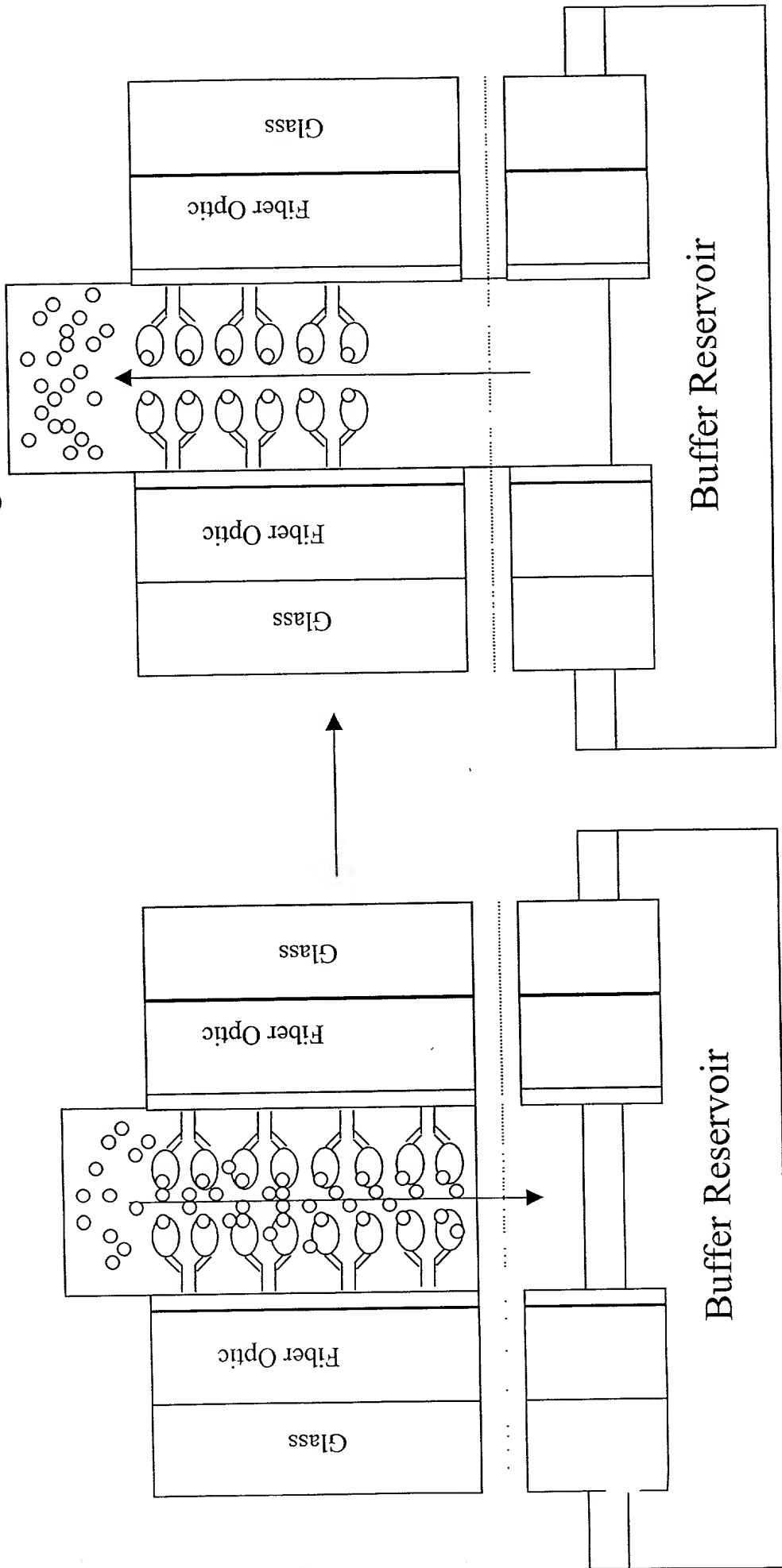


Figure 34 (cont. 2). Capillary Based Receptor Binding Assay: Non-equilibrium

Add compound and use fiber optic based detection to observe kinetics

Move capillary to compound reservoir

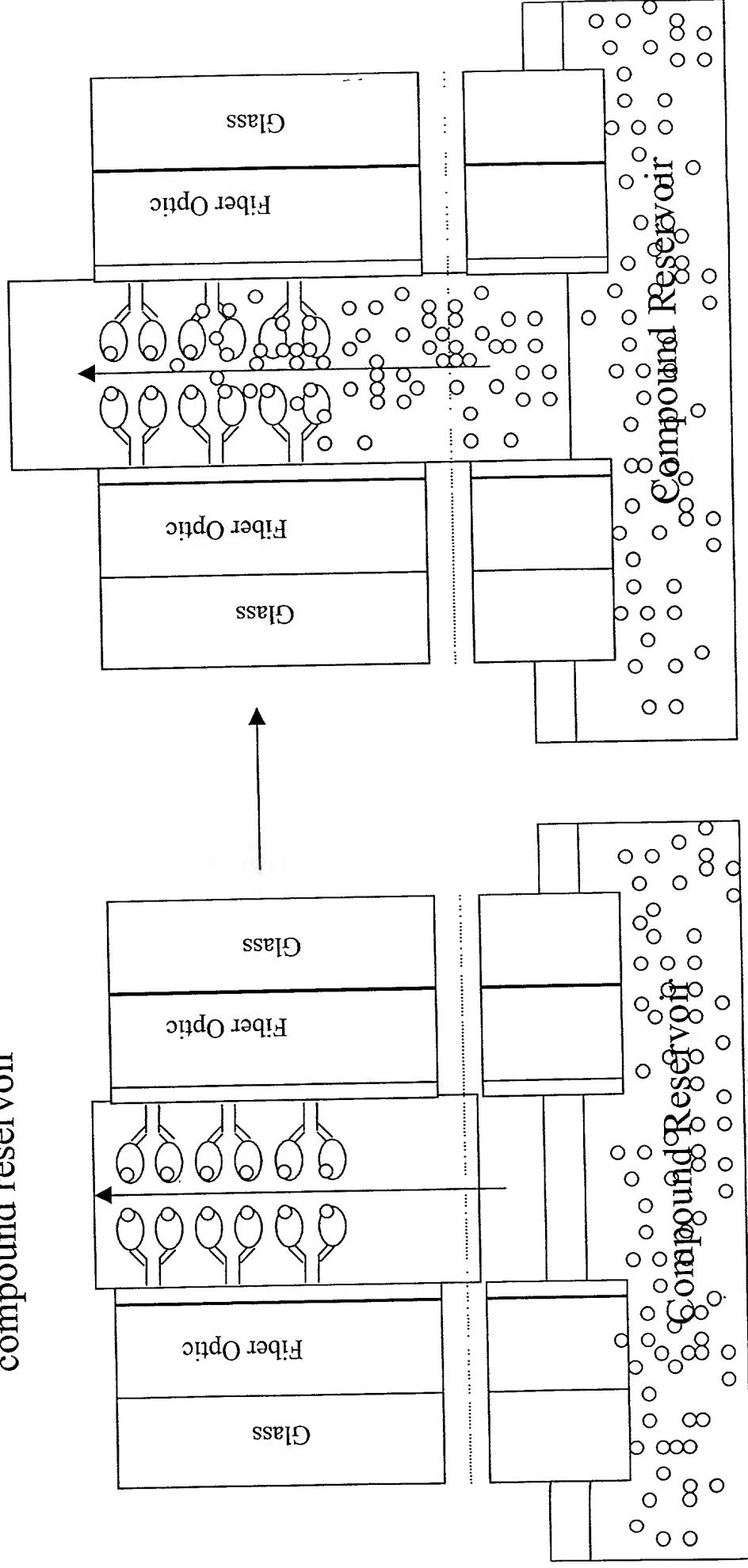
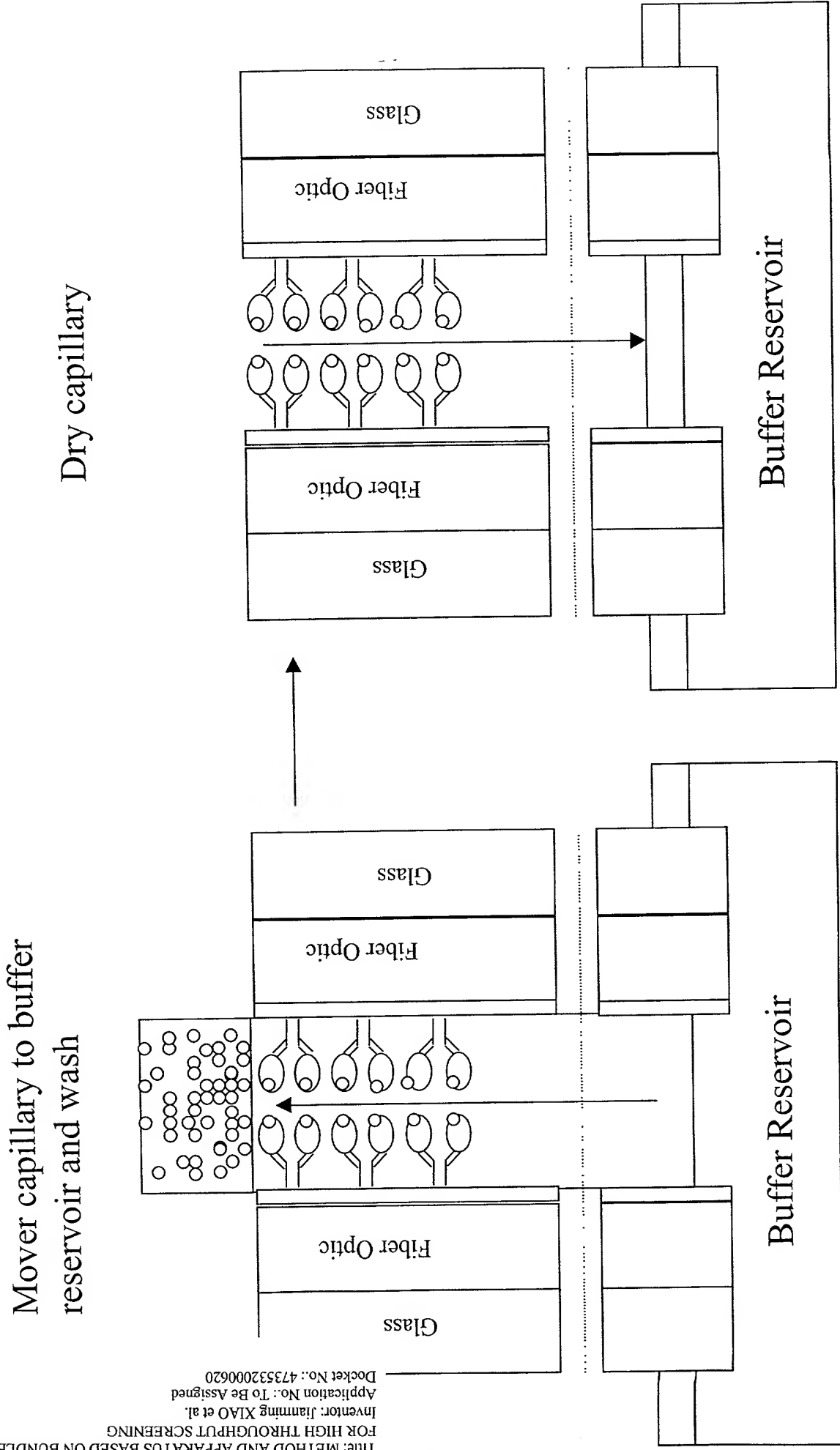


Figure 34 (cont. 3). Capillary Based Receptor Binding Assay: Non-equilibrium



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Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES
FOR HIGH THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 47353320000620

Figure 34 (cont. 4). Capillary Based Receptor Binding Assay: Non-equilibrium

Push an acid plug or detect
% bound using fiber optic
based detection

Apply vacuum
after plug travels
down capillary

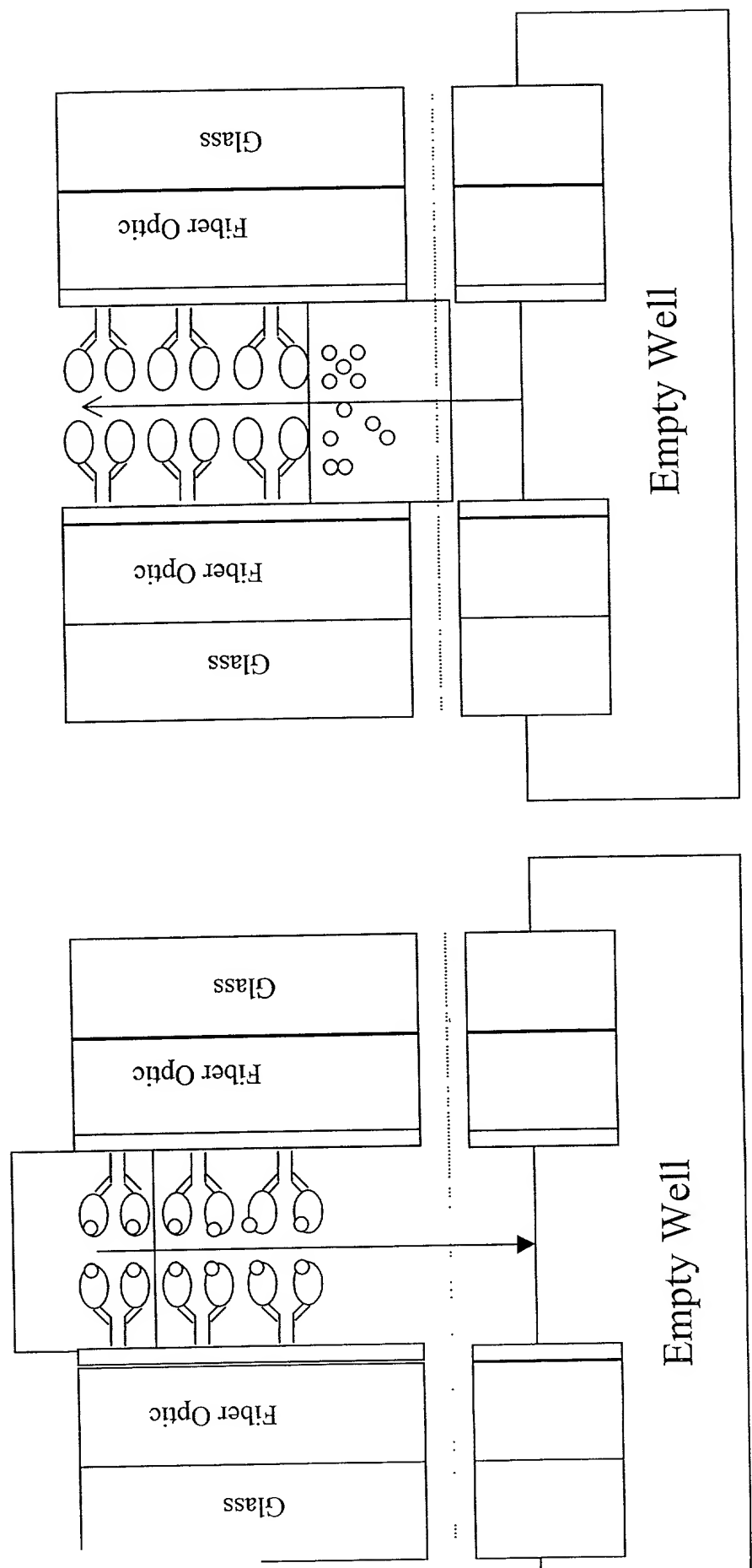


Figure 34 (cont. 5). Capillary Based Receptor Binding Assay: non-equilibrium

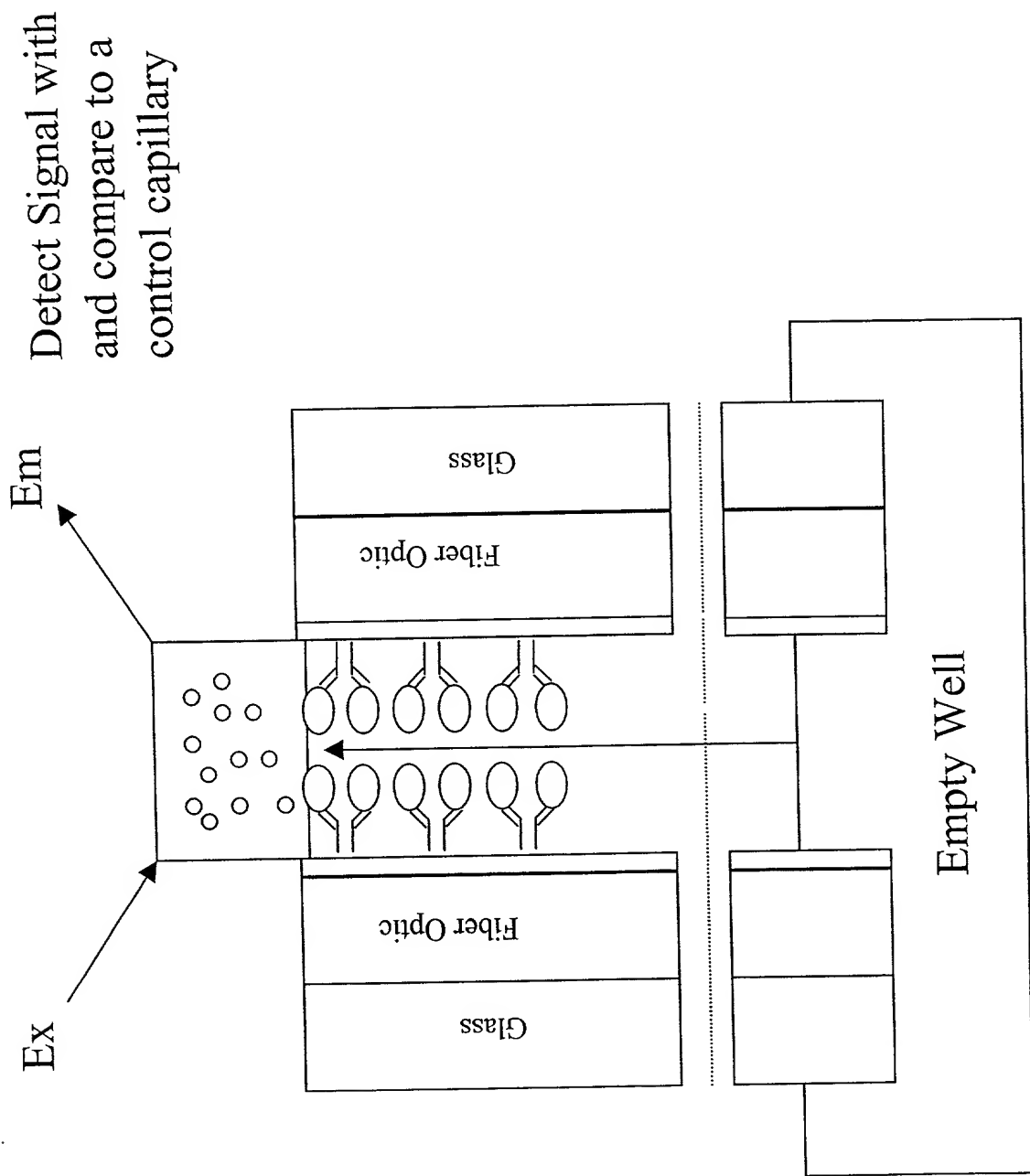


Figure 35 Capillary Based Receptor Binding Assay: Equilibrium

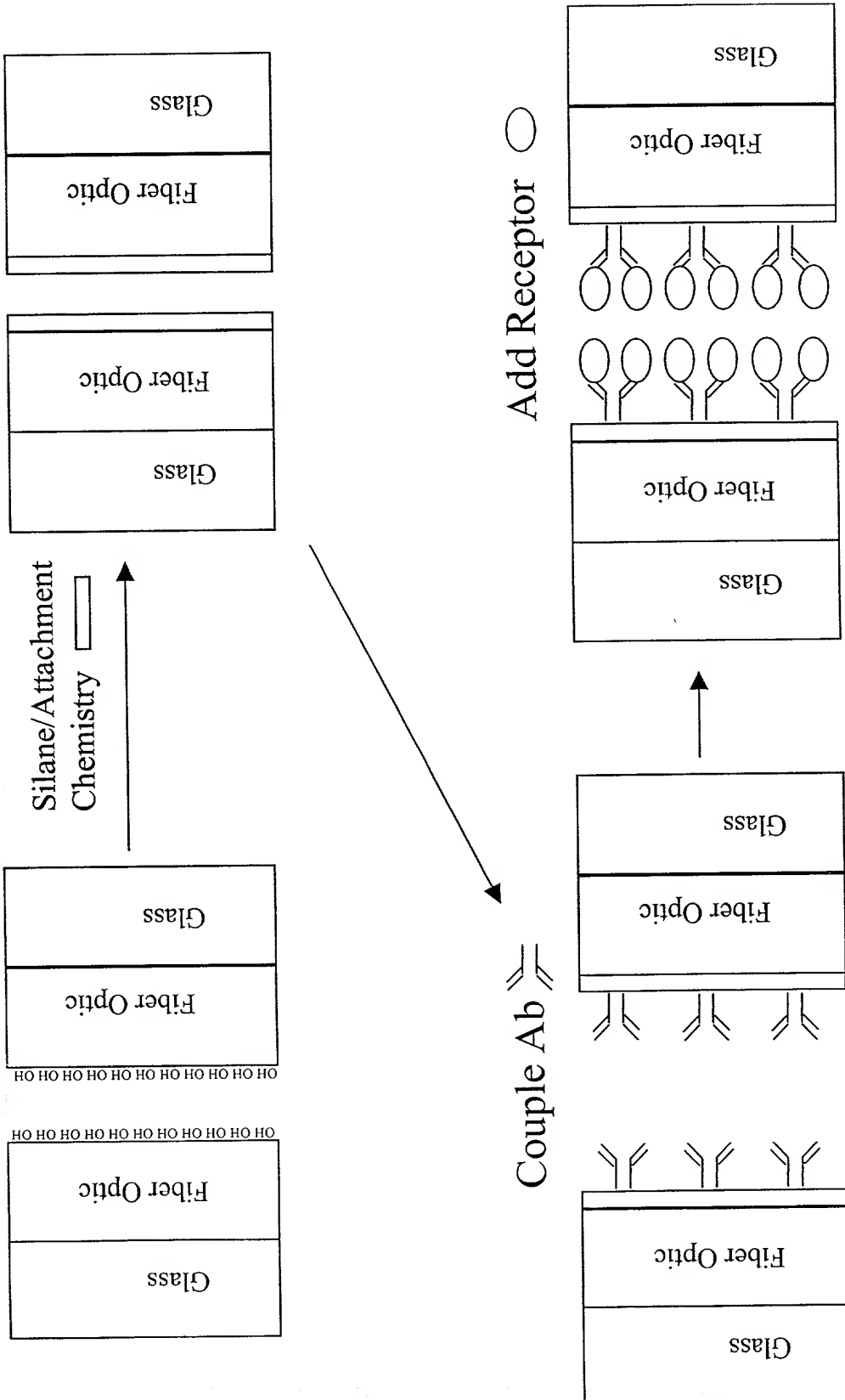


Figure 35 (cont. 1). Capillary Based Receptor Binding Assay: Equilibrium

Move Capillary to compound/ligand reservoir.

Add solution and let system reach equilibrium. Detect equilibrium using fiber optic base detection.

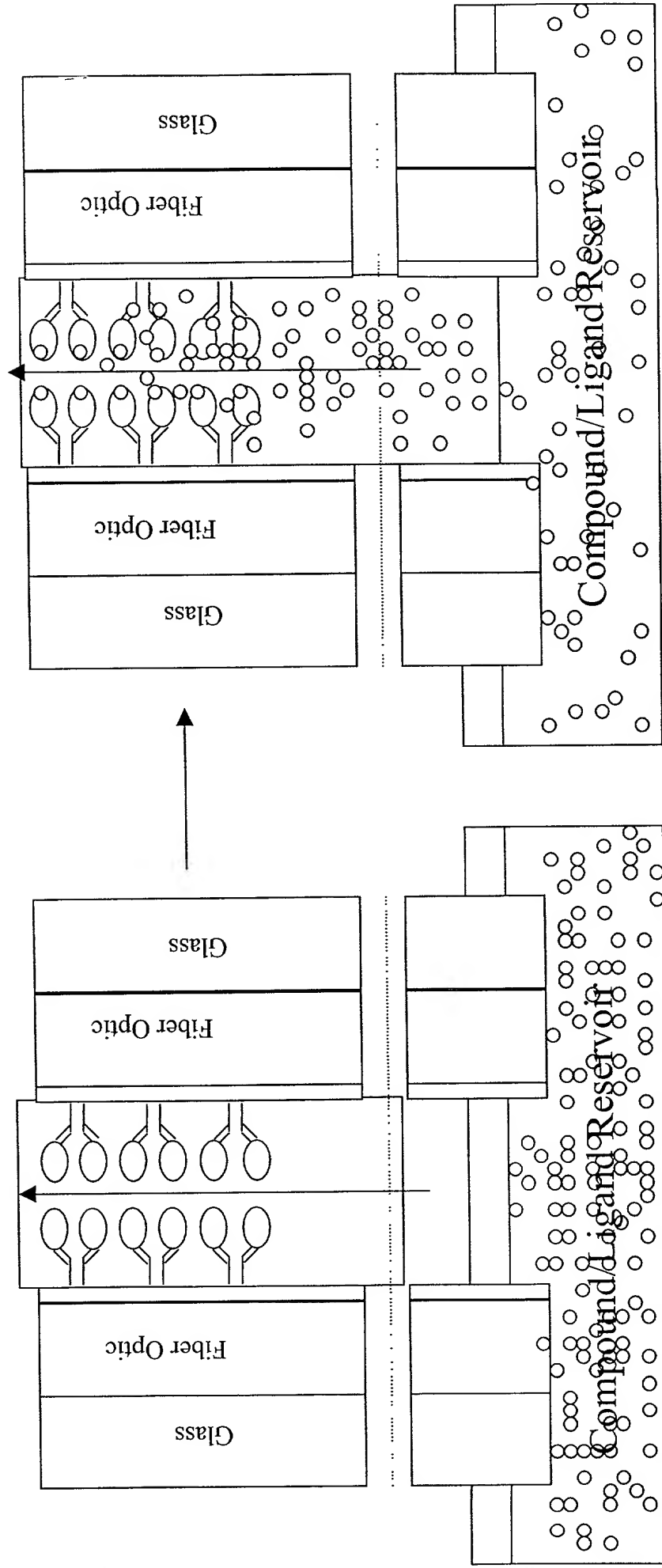


Figure 35 (cont . 2). Capillary Based Receptor Binding Assay: Equilibrium

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Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES
FOR HIGH THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 473532000620

Move capillary to a buffer reservoir and wash capillary with buffer. Detect % bound using fiber optic based detection.

Dry Capillary

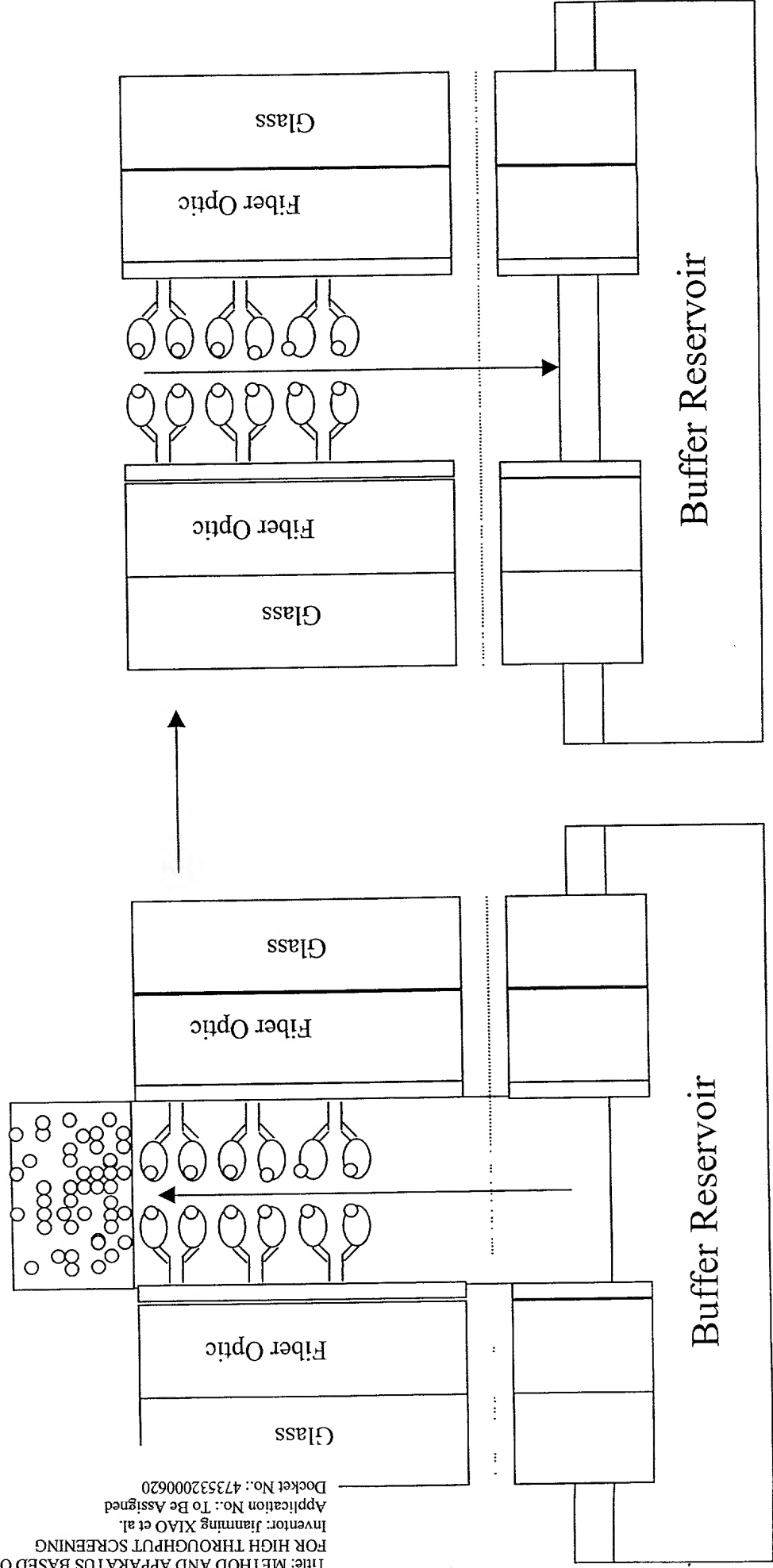


Figure 35 (cont . 3). Capillary Based Receptor Binding Assay: Equilibrium

Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES

Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 47353320000620

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Detect signal using fiber optic
base detection or elute bound
ligand with acid.

Apply vacuum
after pug travels
down capillary

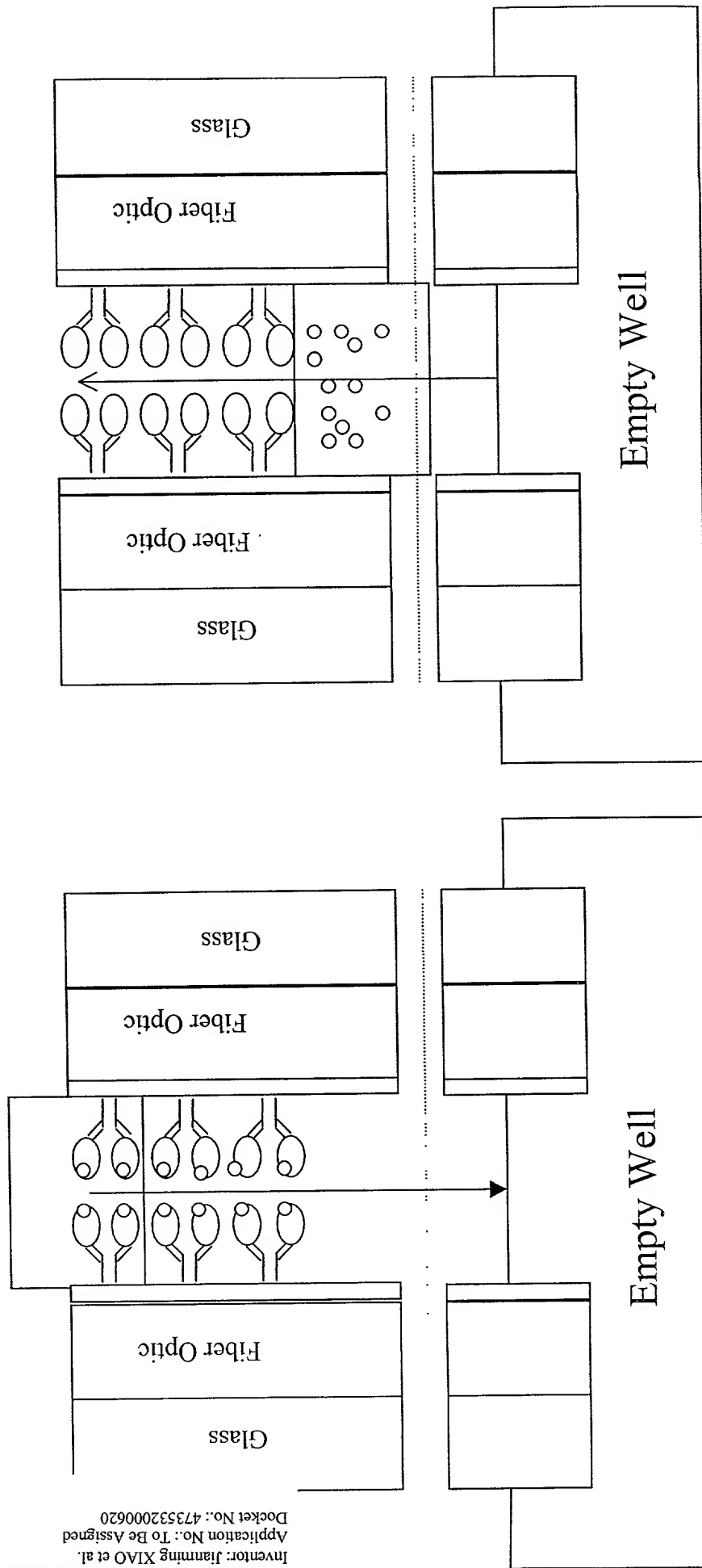
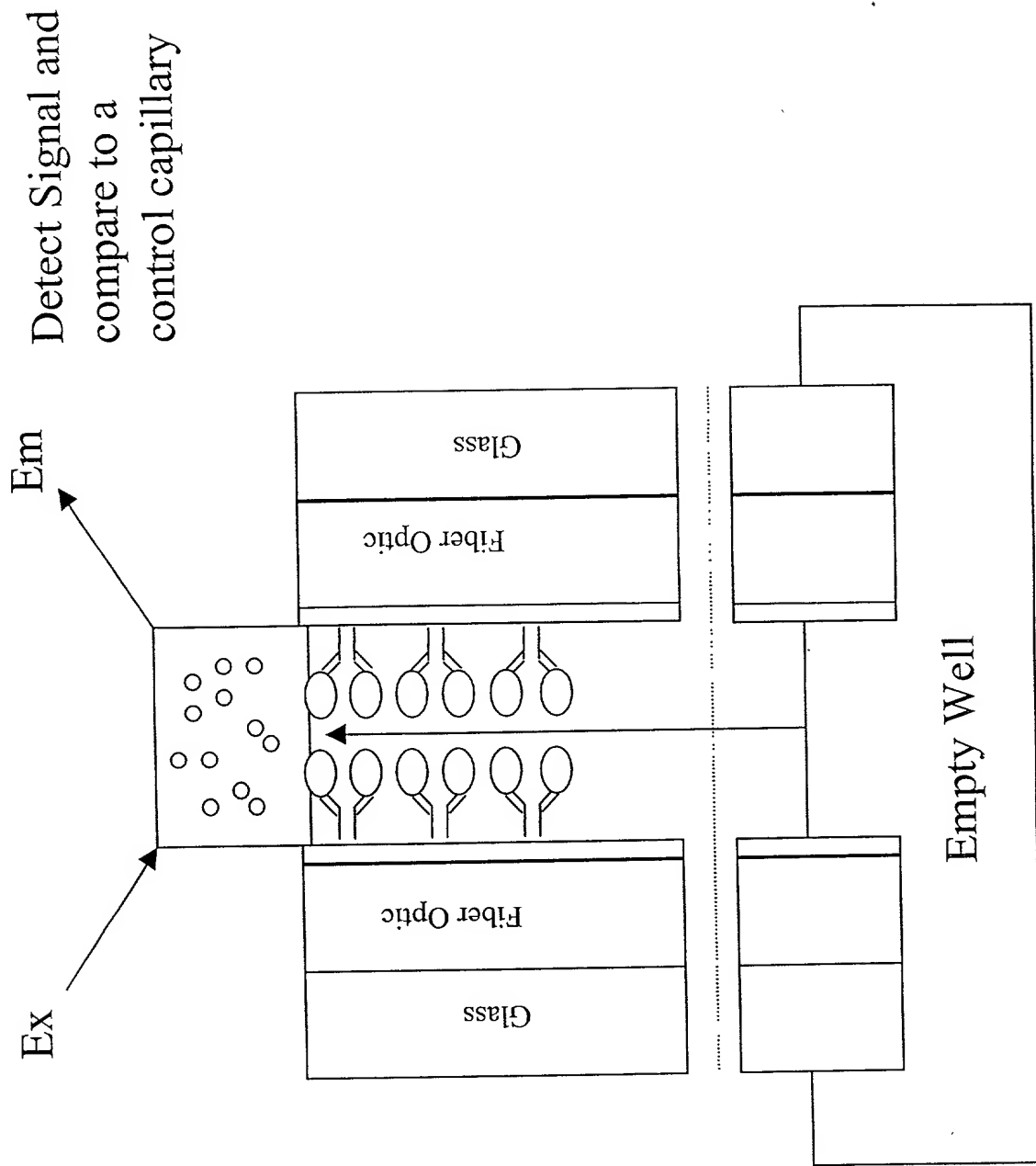


Figure 35 (cont . 4). Capillary Based Receptor Binding Assay: Equilibrium



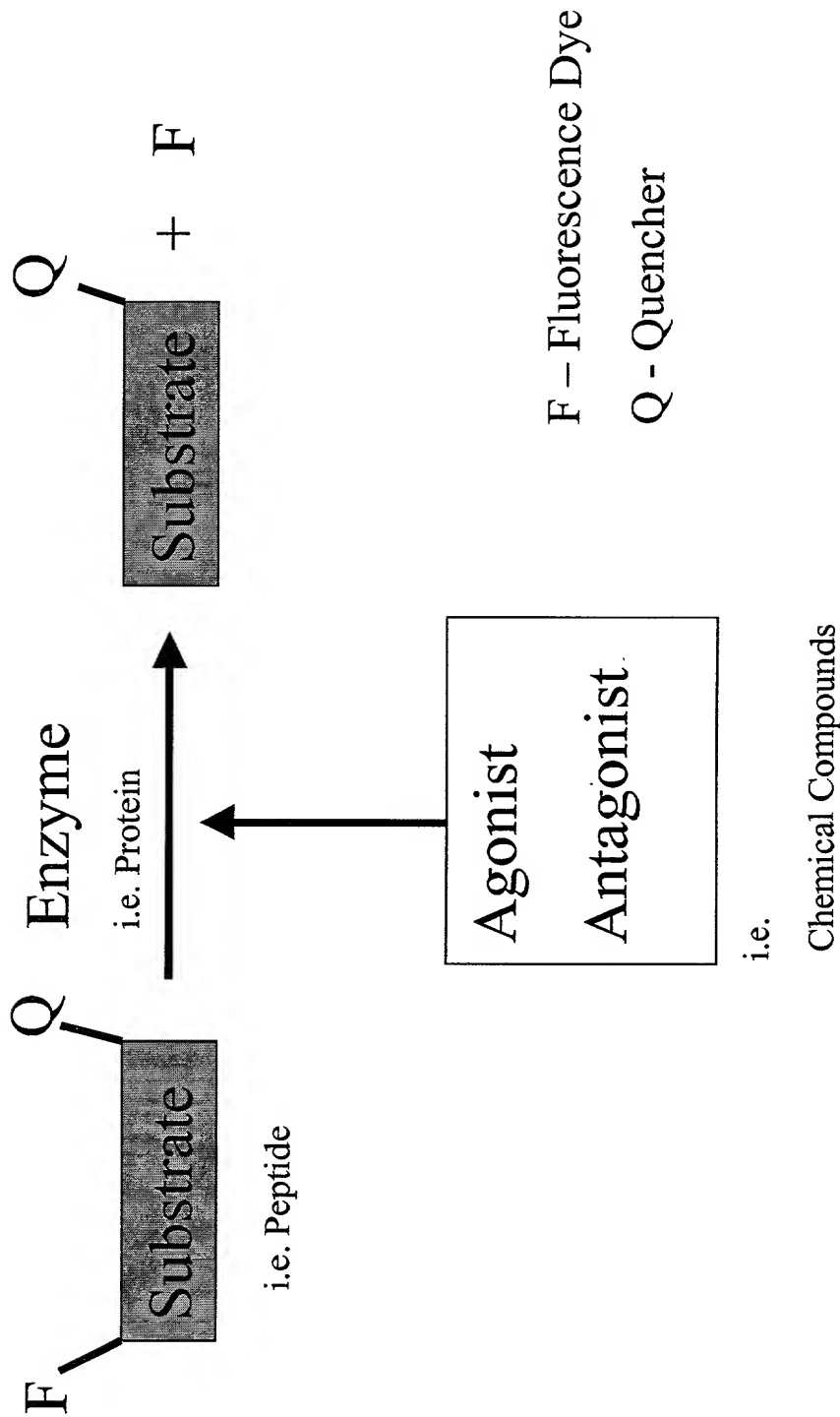
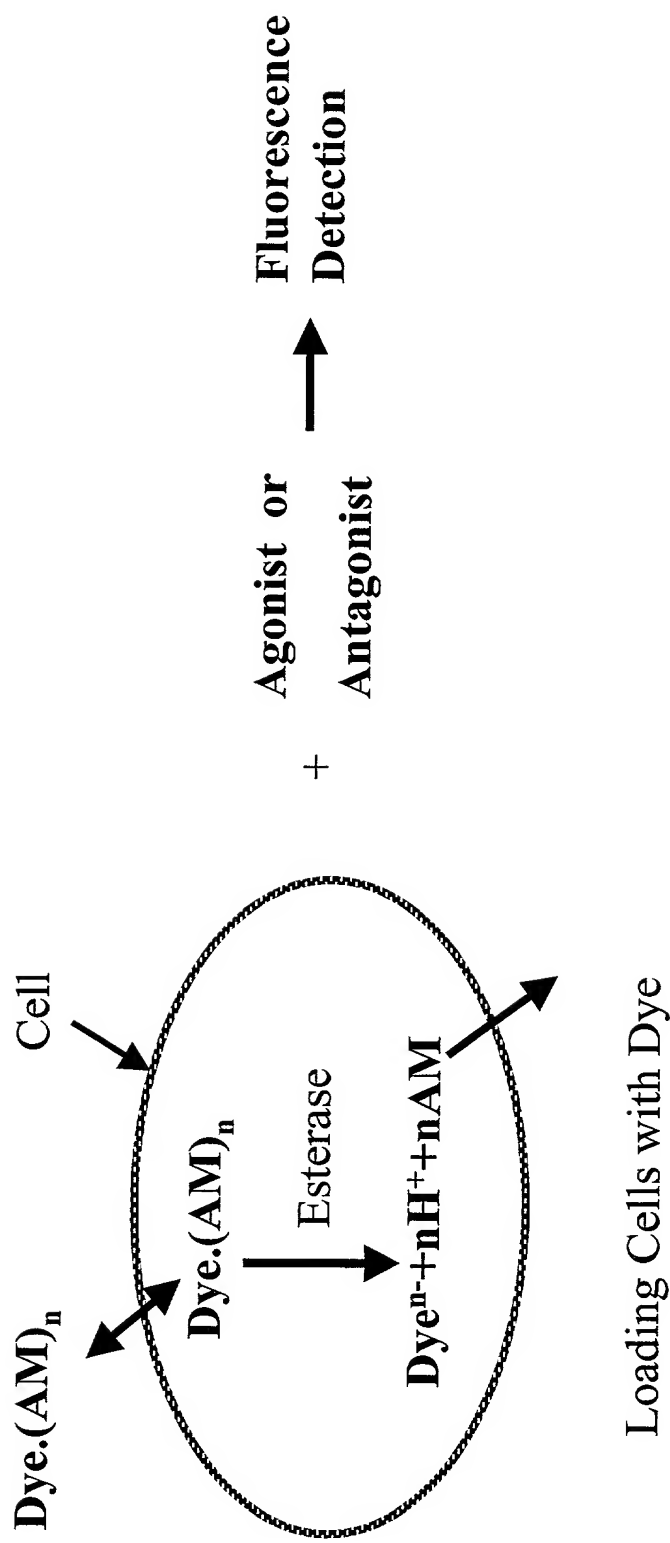


Figure 36

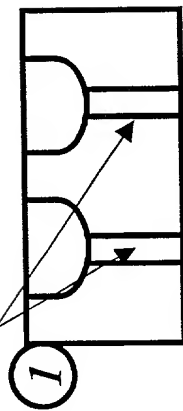


Assay Based on Tracking Cytosolic $[\text{Ca}^{++}]$

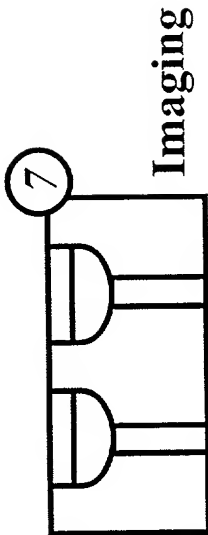
Figure 37

Protein Array & Cell Array

Library of antigen or antibody
Attached to magnetic beads

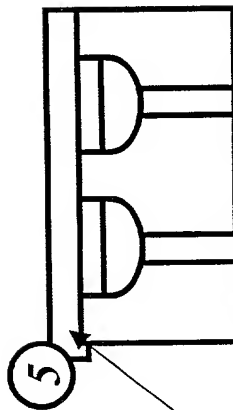


Aspiration
from top



Imaging

Mixing
circle

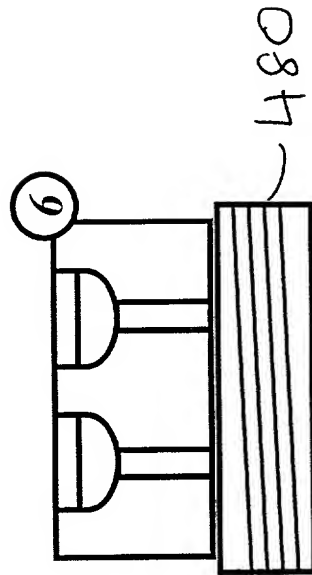


Seal

470

Binding interaction

De-magnetize



Magnetize
& Washing
circle

FIG. 38A

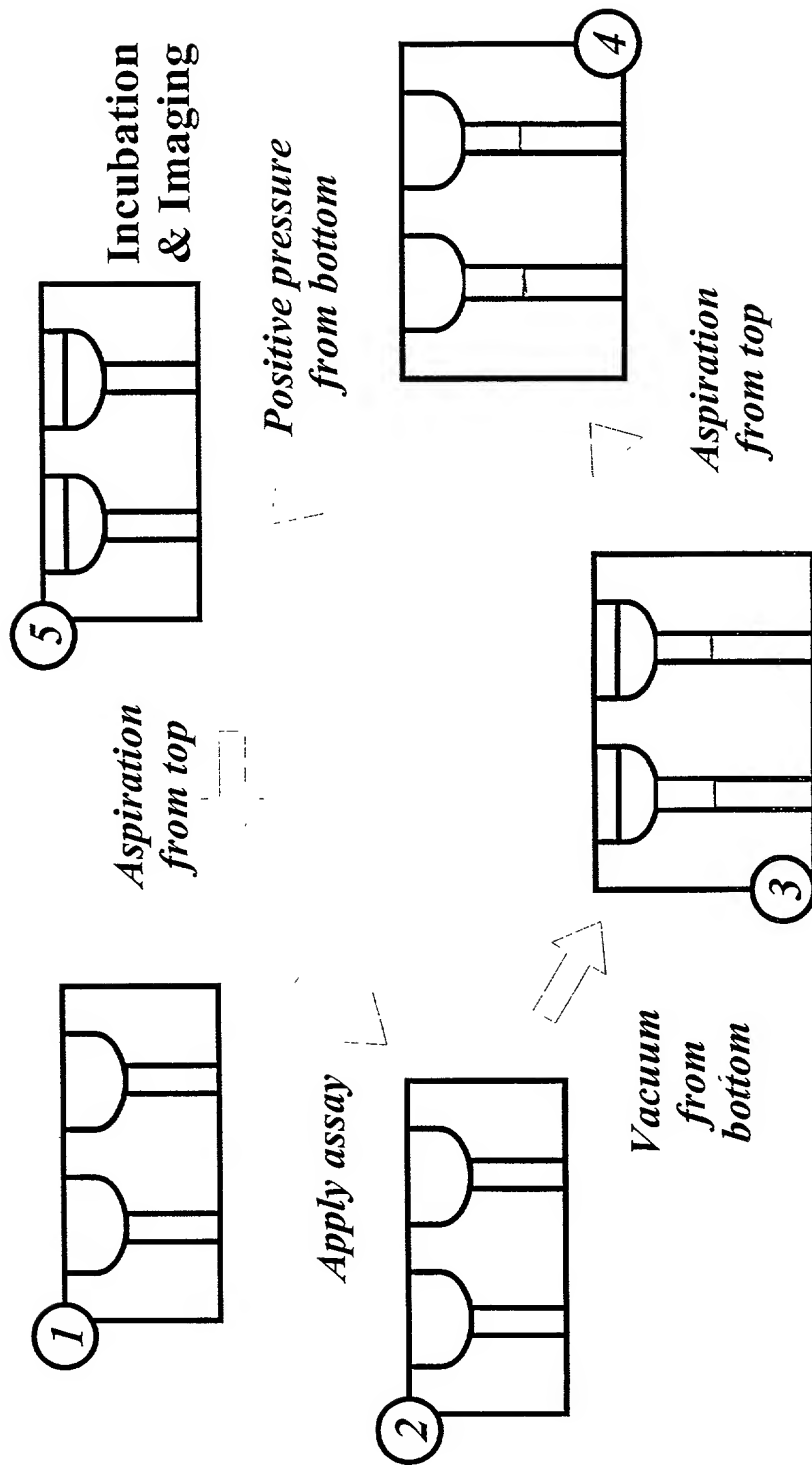


FIG. 3BB

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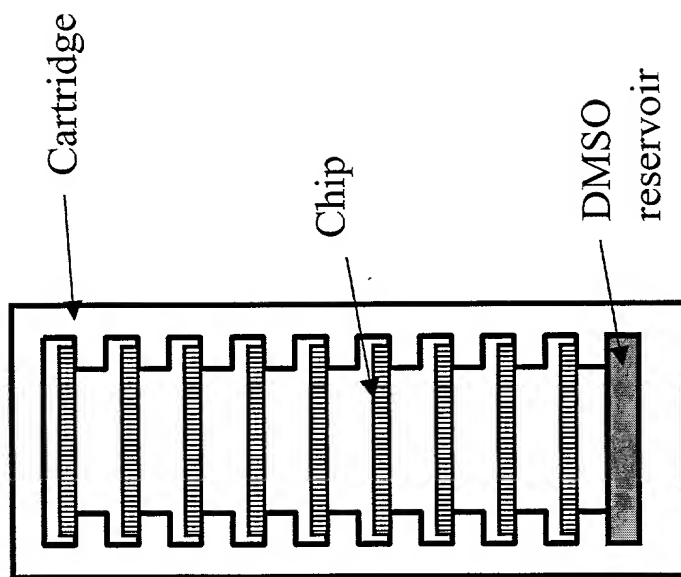
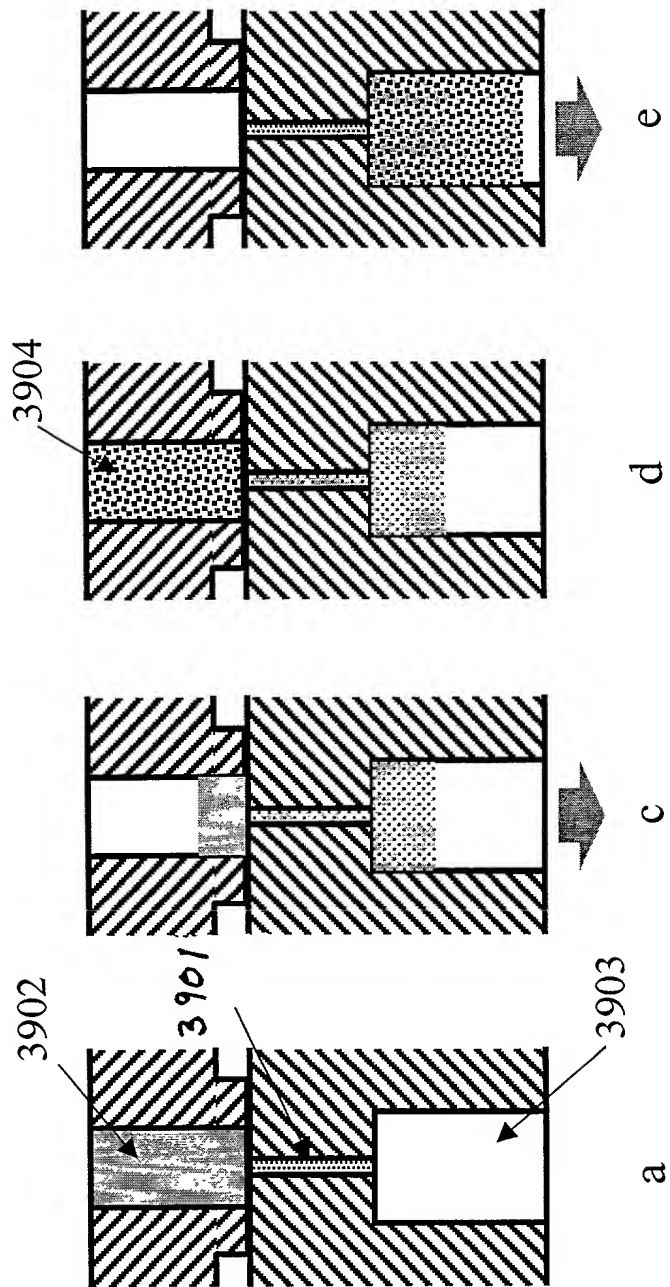


Fig. 39 One embodiment of the capillary array cartridge design

Fig. 40 Metering with through hole plates and mixing



- 3901 – compound and compound storage chamber
- 3902 – reagent A (i.e. enzyme) in through hole plate A
- 3903 – mixing/reaction chamber
- 3904 – reagent B (i.e. substrate) in through hole plate B